UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

JUN 26 2017

REPLY TO THE ATTENTION OF WW-16J

Glenn Skuta, Division Director
Water Division
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 551555-4194

Dear Mr. Skuta:

The U. S. Environmental Protection Agency has reviewed the final Total Maximum Daily Loads (TMDLs) for the Elm Creek watershed (Table 1 of enclosed decision document), including supporting documentation and follow up information. Minnesota's submitted TMDLs for *E. coli*, Total Phosphorus, and Total Suspended Solids address the *E. coli*, fish biotic integrity, macroinvertebrate biotic integrity, nutrient and low dissolved oxygen (DO) impairments affecting the Recreational and Aquatic Use Support in the Elm Creek watershed. Based on this review, EPA has determined that Minnesota's TMDLs for *E. coli*, Total Phosphorus, and Total Suspended Solids meet the requirements of Section 303(d) of the Clean Water Act and EPA's implementing regulations at 40 C.F.R. Part 130. Therefore, EPA hereby approves Minnesota's eighteen TMDLs for the impaired reaches in the Elm Creek watershed. The statutory and regulatory requirements, and EPA's review of Minnesota's compliance with each requirement, are described in the enclosed decision document.

We wish to acknowledge Minnesota's effort in submitting these TMDLs and look forward to future TMDL submissions by the State of Minnesota. If you have any questions, please contact Mr. Peter Swenson, Chief of the Watersheds and Wetlands Branch, at 312-886-0236.

Sincerely,

Linda Holst

for Christopher Korleski
Director, Water Division

Enclosure

cc: Celine Lyman, MPCA
Brooke Asleson, MPCA

wq-iw11-04g

TMDL: Elm Creek Watershed, Minnesota
Date: 06/26/2017 (revised 09/01/2017)

DECISION DOCUMENT
ELM CREEK WATERSHED
E. COLI, TOTAL SUSPENDED SOLIDS and TOTAL PHOSPHORUS TMDLs

Section 303(d) of the Clean Water Act (CWA) and U.S. EPA's implementing regulations at 40 C.F.R. Part 130 describe the statutory and regulatory requirements for approvable TMDLs. Additional information is generally necessary for U.S. EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and U.S. EPA regulations, and should be included in the submittal package. Use of the verb "must" below denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation. Use of the term "should" below denotes information that is generally necessary for U.S. EPA to determine if a submitted TMDL is approvable. These TMDL review guidelines are not themselves regulations. They are an attempt to summarize and provide guidance regarding currently effective statutory and regulatory requirements relating to TMDLs. Any differences between these guidelines and U.S. EPA's TMDL regulations should be resolved in favor of the regulations themselves.

1. Identification of Waterbody, Pollutant of Concern, Pollutant Sources, and Priority Ranking

The TMDL submittal should identify the waterbody as it appears on the State's/Tribe's 303(d) list. The waterbody should be identified/georeferenced using the National Hydrography Dataset (NHD), and the TMDL should clearly identify the pollutant for which the TMDL is being established. In addition, the TMDL should identify the priority ranking of the waterbody and specify the link between the pollutant of concern and the water quality standard (see section 2 below).

The TMDL submittal should include an identification of the point and non-point sources of the pollutant of concern, including location of the source(s) and the quantity of the loading, e.g., lbs/per day. The TMDL should provide the identification numbers of the NPDES permits within the waterbody. Where it is possible to separate natural background from non-point sources, the TMDL should include a description of the natural background. This information is necessary for U.S. EPA's review of the load and wasteload allocations, which are required by regulation.

The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as:

(1) the spatial extent of the watershed in which the impaired waterbody is located;
(2) the assumed distribution of land use in the watershed (e.g., urban, forested, agriculture);
(3) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources;
(4) present and future growth trends, if taken into consideration in preparing the TMDL (e.g., the TMDL could include the design capacity of a wastewater treatment facility); and
(5) an explanation and analytical basis for expressing the TMDL through *surrogate measures*, if applicable. *Surrogate measures* are parameters such as percent fines and turbidity for sediment impairments; chlorophyl *a* and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

Comments:

***Waterbody Identification Discussion*:**

The Elm Creek Watershed is located in the northwest part of the Minneapolis-St. Paul Metro Area within northern Hennepin County in Minnesota (See Figure 1 of the final TMDL report). The Elm Creek Watershed includes all or part of seven municipalities: Champlin, Corcoran, Dayton, Maple Grove, Medina, Plymouth, and Rogers. The Elm Creek Watershed lies in the North Central Hardwood Forest Ecoregion, has a watershed area of approximately 66,400 acres, and drains in the Upper Mississippi River Basin. All but two of the impaired waters that will be addressed in this document lie within the hydrologic boundary of the Elm Creek Watershed. The exceptions are Cowley Lake and Sylvan Lake, both of which lie to the northwest of the Elm Creek hydrologic boundary in the Crow River watershed within the City of Rogers. The impairments for both lakes are addressed in this document because they lie within the jurisdictional boundaries of the Elm Creek Watershed Management Commission (ECWMC). The submitted TMDLs include *E. coli*, Total Suspended Solids (TSS) and Total Phosphorus (TP) TMDLs to address *E. coli*, nutrient, low dissolved oxygen (DO), and fish biotic integrity and macroinvertebrate biotic integrity impairments contributing to the nonattainment of the recreational and aquatic life uses affecting the impaired waterbody assessment units in the watershed (See Table 1 below; and Table 1 and Figure 3 of the final TMDL report).

Table 1

Assessment Unit (AU) Name	AU ID	Affected Use	Pollutant(s)	Impairment(s) Addressed by TMDL
Diamond Creek	07010206-525	Aquatic Recreation	*E. coli*	*E. coli* [1]
		Aquatic Life	TP, TSS	Fish Biotic Integrity, Macroinvertebrate Biotic Integrity, Low DO [1]
Rush Creek	07010206-528	Aquatic Life	TP	Fish Biotic Integrity, Macroinvertebrate Biotic Integrity, Low DO [1]
		Aquatic Recreation	*E. coli*	*E. coli* [1]
Rush Creek, South Fork	07010206-732	Aquatic Recreation	*E. coli*	*E. coli* [1]
		Aquatic Life	TP	Fish Biotic Integrity, Macroinvertebrate Biotic Integrity [1]
Rush Creek, South Fork	07010206-760	Aquatic Life	TP	Fish Biotic Integrity, Macroinvertebrate Biotic Integrity [1]
Elm Creek - Headwaters	07010206-508	Aquatic Life	TP, TSS	Fish Biotic Integrity, Macroinvertebrate Biotic Integrity, Low DO [1]
		Aquatic Recreation	*E. coli*	*E. coli* [1]
Cowley Lake	27-0169	Aquatic Recreation	TP	Nutrients [1]
Diamond Lake	27-0125	Aquatic Recreation	TP	Nutrients [1]
Fish Lake	27-0118	Aquatic Recreation	TP	Nutrients [1]
Henry Lake	27-0175	Aquatic Recreation	TP	Nutrients [1]
Rice Lake-Main	27-0116-01	Aquatic Recreation	TP	Nutrients [1]
Sylvan Lake	27-0171	Aquatic Recreation	TP	Nutrients [2]
Goose Lake	27-0122	Aquatic Recreation	TP	Nutrients [2]

[1] AUs/Impairments listed in Minnesota's 2014 303(d) List.
[2] AUs/Impairments proposed to be listed in Minnesota's 2016 303(d) List.

The land use in the Elm Creek Watershed is primarily composed of agriculture (32.1%), undeveloped/vacant (27.2%), residential (19.2%), parks/recreational (12.8%), commercial/industrial (2.7%), water (3.5%), institutional (1.2%), and transportation (1.1%) (See Table 5 and Figure 4 of the final TMDL report). The land use in the Cowley Lake subwatershed is primarily composed of agriculture (48.4%), undeveloped/vacant (31.4%), residential (12.3%), water (6.4%), institutional (0.8%), commercial (0.5%), and parks/recreational (0.1%). The land use in the Sylvan Lake subwatershed is primarily composed of agriculture (53.3%), undeveloped/vacant (25.8%), residential (18.1%), and parks/recreational (2.8%). The Cowley Lake and Sylvan Lake subwatersheds lie to the northwest of the Elm Creek hydrologic boundary.

Pollutant(s) of Concern Discussion:

The chemical and biotic impairments affecting waterbodies in the Elm Creek Watershed were identified based on monitoring data collected by the MPCA, the Elm Creek Watershed Management Commission (ECWMC), and others during the 10-year period between 2003 and 2012.

***E. coli* bacteria** are indicator organisms that are usually associated with harmful organisms transmitted by fecal matter contamination. These organisms can be found in the intestines of warm-blooded animals (humans and livestock). The presence of *E. coli* and fecal coliform bacteria in water suggests the presence of fecal matter associated bacteria, viruses, and protozoa that are pathogenic to humans when ingested. Based on bacteria sampling data collected from April through October in 2007 through 2012 (Table 6 of the final TMDL report), *E. coli* exceedances were found for both the monthly geometric mean and acute criteria that indicated *E. coli* impairment in the Elm Creek Watershed.

Total Phosphorus (TP) is an essential nutrient for aquatic life, but elevated concentrations of TP can lead to nuisance algal blooms that negatively impact aquatic life and recreation (swimming, boating, fishing, etc.). Excess plant nutrients, mainly nitrogen and phosphorus, from human-driven activities contribute to excess productivity which manifests itself as an increase in algal blooms and a consequent decrease in water clarity, both of which may significantly impair or prohibit the aquatic recreation use. Excess algae increases turbidity which degrades aesthetics and causes adverse ecological impacts. Algal decomposition depletes oxygen levels which stress aquatic biota (fish and macroinvertebrate species). Oxygen depletion can cause phosphorus release from bottom sediments (i.e. internal loading), which contributes to increased nutrient levels in the water column. Excess phosphorus can alter biological communities by shifting species composition toward organisms better suited to deal with excess phosphorus. The monitoring data collected in June through September from 2003 through 2012 (Table 28 of the final TMDL report), which were used to calculate the growing season averages for nutrient water quality parameters (TP, chlorophyll-*a*, and Secchi depth) (Figures 5-11 of the final TMDL report), indicated nutrient impairment lake conditions in the Elm Creek Watershed, and Cowley and Sylvan Lakes Subwatersheds.

Dissolved oxygen (DO) is an important water quality parameter for the protection and management of aquatic life. All higher life forms, including fish and aquatic macroinvertebrates, are dependent on minimum levels of oxygen for critical life cycle functions such as growth, maintenance, and reproduction. DO concentrations go through a diurnal cycle in most rivers and streams with concentrations reaching their daily maximum levels in late afternoon when photosynthesis by aquatic plants is highest. Minimum DO concentrations typically occur early in the morning around sunrise when respiration rates exceed photosynthesis and oxygen is being consumed by aquatic organisms faster than it is replaced. Problems with low dissolved oxygen in river systems are often the result of excessive loadings of biochemical oxygen demanding (BOD) substances, particularly in combination with high temperatures and low flow conditions. See Table 2 below for a summary of conditions that can cause low DO levels.

Table 2

Low DO Causing Conditions Summary	
Loading of Biochemical Oxygen Demanding (BOD) Substances	BOD is comprised of two components: carbonaceous BOD (CBOD) and nitrogenous BOD (NBOD). CBOD is the reduction of organic carbon to carbon dioxide through the metabolic action of microorganisms. NBOD is the term for the oxygen required for nitrification, which is the biologic oxidation of ammonia to nitrate. NBOD is typically calculated by subtracting CBOD from total BOD. Carbonaceous demand is usually exerted first, normally as a result of a lag in the growth of the nitrifying bacteria necessary for oxidation of the nitrogen forms. High ammonia levels are typically associated with elevated NBOD as it indicates organic matter is decomposing rapidly within the system or there are significant inputs of human/animal waste. Loading of biochemical oxygen demanding (BOD) substances can be from both "natural" and human-caused sources. Natural sources of BOD include plant decay, leaf fall and decomposition, and, at times, wetlands. Algal growth is commonly identified as a significant source of BOD in watersheds with elevated nutrient levels. The most common human-related inputs are those associated with effluent from WWTFs. The MS4s can also discharge oxygen-depleting organic matter in the form of grass clippings, leaves, and pet waste. Organic matter from livestock and other agricultural operations is also another potential source. Generally, discharges from WWTFs and designated municipal separate stormwater systems are permitted sources, while those associated with natural sources and most agricultural operations are non-permitted sources.
High Nutrient Levels/ Eutrophication	High in-stream nutrient concentrations often lead to eutrophication, characterized by accelerated primary production in the form of plants. The plants affected can be rooted aquatic plants, free-floating algae suspended in the water column (especially in low gradient, slow-moving streams), periphyton (which are plants attached to substrate that does not wash away, such as rocks, logs, etc.), or some combination of the three. The plants cause high oxygen levels during sunlit daylight hours when they are photosynthesizing and producing oxygen. During the night, when there is no sunlight to support photosynthesis, oxygen levels are driven down since plants respire and consume oxygen. Often the lowest levels of oxygen in this type of system occur early in the morning. In addition, when plants die, microorganisms that facilitate the decomposition process consume dissolved oxygen while at the same time releasing nutrients back into the water column.
Stream Geomorphology	The ability of streams to take in oxygen from the atmosphere is often highest in rocky bottomed streams with swift moving, agitated waters. Thus, changes to stream morphology such as smoothing of the stream bottom, deepening/widening of the channel, impoundments and flow-through wetlands, etc. can greatly affect re-aeration and DO concentrations. During periods of very low flow, there is often limited low-flow channel meandering across the streambed. If this occurs in summer when water temperatures may be high already, exposed sediments, shallow stagnant pools, and excessive aquatic plant/algae growth can all exacerbate oxygen depletion. Shallow impoundments, including wetlands, on streams or rivers can have a great influence on downstream dissolved oxygen. Often, impoundments raise the temperature of the water during the warm months of the year, and warmer water cannot hold as much oxygen as cooler water. In addition, shallow impoundments slow flows resulting in deposition and accumulation of organic and finer sediment particles which often exert an elevated demand for oxygen. Finally, shallow impoundments/wetlands on nutrient-rich streams can support extensive submergent and emergent aquatic plant communities as well as periphyton, and/or planktonic algal communities. The same eutrophication-driven processes described in the previous paragraph can be exacerbated and exert an even more profound effect on downstream dissolved oxygen levels.

Table 2

Low DO Causing Conditions Summary	
Sediment Oxygen Demand (SOD)	SOD is the aerobic decay of organic materials that settle to the bottom of the stream. In natural, free-flowing streams, SOD is usually considered negligible because frequent scouring during storm events prevents long-term accumulation of organic materials.
Water Temperature	Streams with cooler temperatures have higher dissolved oxygen content than streams with warmer water temperatures. This is because oxygen is more soluble in cooler water than warmer water. Canopy coverage may also have an effect on stream dissolved oxygen content. Decreased shading leads to more sunlight exposure which often warms the water and in turn decreases the amount of oxygen the water can hold. Shading plays a bigger role in governing the temperature of small streams like those in the Elm Creek Watershed than it does in larger rivers, where even robust shoreline vegetation can only shade a very small percentage of the river's surface. Streams with a strong baseflow driven by cool groundwater (GW) inputs can support higher dissolved oxygen levels during the summer because GW temperatures are generally significantly lower than normal surface water temperatures. However, GW itself often has low dissolved oxygen (sometimes close to zero), and therefore can exert a negative impact on stream dissolved oxygen concentrations unless opportunities exist to re-aerate the cool water discharge from the GW system.

Monitoring data collected from 2007 through 2012 (Table 7 of the final TMDL report) indicated low levels of dissolved oxygen impairing streams in the Elm Creek Watershed.

Excess Sediment (Total Suspended Solids (TSS)) can affect stream biota through a variety of mechanisms. Adverse ecological impacts caused by excessive TSS include hampering the ability of aquatic organisms to visually locate food, impaired gill function, and smothering of spawning beds and benthic organism habitat. As stream bottoms become embedded by fine sediments, the historically heterogeneous habitat becomes homogenous with respect to particle size and habitat diversity. In response to excess sediments, stream communities often become less diverse and dominated by species that thrive in habitats comprised of smaller particles (e.g., sand and silt). Functional feeding group composition also commonly shifts in response to increased sedimentation. As sedimentation increases, the availability of substrate for periphyton decreases and as a result, the primary food source becomes coarse particulate organic matter (CPOM). In response, the proportion of shredder and collector-gatherer species generally increases. Although the proportional availability of CPOM increases, the relative abundance of collector-filterers often decreases—generally because of the direct impact of sediments on filtering or the loss of substrate for filterer attachment. Common collector-filterers indicator taxa that often decrease in response to sedimentation are net spinning caddisflies and bivalves. Table 25 of the final TMDL report summarizes TSS data collected by stream reach and by monitoring station within the Elm Creek Watershed during the period 2003 to 2012.

Biological Integrity Stressors:
The TP, TSS, altered hydrology, altered habitat, and low dissolved oxygen were all found to be stressors to aquatic life to varying degrees. A summary of evidence for each of these is provided in Table 23 and Table 24 of the final TMDL report. As a result of the Stressor Identification (SI) process, TP was found to be a primary stressor in all five listed stream reaches and TSS was found to be a primary stressor in two of the five reaches (Table 23 of the final TMDL report). More detailed information can be found in Section 4.3 of the final TMDL report and the Elm Creek Stressor Identification Report (http://www.pca.state.mn.us/index.php/view-document.html?gid=23379).

Sources Discussion:

Point sources contributing to the impairments in Elm Creek Watershed include: one permitted domestic wastewater discharge facility – Maple Hill Estates mobile home park (Permit # MN0031127); nine (9) Municipal Separate Storm Sewer Systems (MS4s) (Table 3 below and Table 10 and Appendix I of the final TMDL report); and construction and industrial stormwater (Table 4 below).

Table 3

MS4	Permit #
City of Champlin	MS400008
City of Corcoran	MS400081
City of Dayton	MS400083
Hennepin County	MS400138
City of Maple Grove	MS400102
City of Medina	MS400105
MnDOT Metro District	MS400170
City of Plymouth	MS400112
City of Rogers	Future MS4

Table 4

Stormwater Discharge Type	Permit #
General Stormwater Permit for Construction Activity	MNR100001
Industrial Stormwater Multi-Sector General Permit	MNR050000
General Permit for Construction Sand & Gravel, Rock Quarrying and Hot Mix Asphalt Production facilities	MNG490000

Nonpoint sources contributing to the impairments in Elm Creek Watershed include agricultural runoff (from row crops, surface applied manure, over-grazed pastures, and feedlots), non-regulated stormwater runoff, wildlife, failing/nonconforming subsurface sewage treatment systems (SSTS), and streambank erosion.

Runoff from agricultural lands (cropland, pastures and smaller feedlots) can contain significant amounts of pollutants (bacteria, sediments and nutrients). Loadings from livestock can occur from feedlots and/or land areas where manure has been applied for disposal and crop nutrient management purposes. Delivery of the associated bacteria and organic matter load is usually a result of precipitation runoff events that provide the transport mechanism to move the bacteria to a conveyance system or receiving water. In addition, livestock with direct access to receiving waters or the conveyance systems that feed them can deliver bacteria loads in the absence of runoff-driven processes. Failing or non-conforming ISTSs (Individual Sewage Treatment Systems) can also be a source of *E. coli* to streams, especially during dry periods when these sources continue to discharge and runoff-driven processes are not occurring. Soil loss from agricultural field erosion, livestock grazing, stormwater from impervious surfaces, and streambank erosion can be a source of sediment to surface waters.

The primary sources contributing to ***E. coli*** loading to the Elm Creek Watershed include livestock, wildlife, and failing septic systems (Figures 12-15 and Appendix B of the final TMDL report).

The sources contributing to the **TSS** loading to the Elm Creek Watershed include soil loss from agricultural field erosion, livestock grazing, stormwater from construction sites and impervious surfaces, and streambank erosion.

The primary sources contributing to the **TP** loading causing the **nutrient/ eutrophication** impairments in the Elm Creek Watershed include atmospheric deposition, internal nutrient recycling from lake bottom sediments, and watershed (external) loading from regulated and non-regulated stormwater runoff.

Phosphorus internal loading in lakes refers to the phosphorus load that is released from the lake bottom sediments into the water column. This often occurs when anoxic conditions are present at the sediment-water interface (hypolimnion), predominantly due to lake stratification[1] throughout the summer growing season. Under anoxic conditions, weak iron-phosphorus bonds break, releasing phosphorus in a highly available form for algal uptake. Internal loading builds nutrients and algae to very high levels, and reduces water clarity. Overabundance of aquatic plants can limit recreation activities and invasive aquatic species such as curly-leaf pondweed can change the dynamics of internal phosphorus loading. The senescence of curly-leaf pondweed provides an internal source of nutrients within several impaired lakes of the Elm Creek watershed. Nutrients released from the senescence process are in a soluble form readily available for algae uptake. Consequently, algae blooms frequently develop causing a decrease in water clarity. The senescence of curly-leaf pondweed exacerbates the eutrophication process by causing poor water quality conditions earlier in the season.

Priority Ranking:

Minnesota's 2014 303(d) list includes a projected schedule for TMDL completions. This schedule reflects the state's priority ranking of impaired waters. MPCA identified a TMDL completion target date of 2014 for the impaired reaches addressed in the Elm Creek Watershed TMDLs (Table 1 of the final TMDL report).

U.S. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this first element.

2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target

The TMDL submittal must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the antidegradation policy. (40 C.F.R. §130.7(c)(1)). U.S. EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

The TMDL submittal must identify a numeric water quality target(s) – a quantitative value used to measure whether or not the applicable water quality standard is attained. Generally, the pollutant of concern and the numeric water quality target are, respectively, the chemical causing the impairment

[1] Lake stratification refers to the separation of lakes into three layers due to a change in the water's density caused by the temperature changes at different depths in the lake. These three layers include the Epilimnion (top of the lake), the Metalimnion or thermocline (middle layer that may change depth throughout the day), and the Hypolimnion (the bottom layer).

and the numeric criteria for that chemical (e.g., chromium) contained in the water quality standard. The TMDL expresses the relationship between any necessary reduction of the pollutant of concern and the attainment of the numeric water quality target. Occasionally, the pollutant of concern is different from the pollutant that is the subject of the numeric water quality target (e.g., when the pollutant of concern is phosphorus and the numeric water quality target is expressed as Dissolved Oxygen (DO) criteria). In such cases, the TMDL submittal should explain the linkage between the pollutant of concern and the chosen numeric water quality target.

Comments:

The Elm Creek Watershed is located in the North Central Hardwood Forest Ecoregion. The TMDL targets were chosen to accommodate Class 2 waters, which are the most protective designated beneficial use class in the project area. Class 2 waters include all waters of the state that support or may support fish, other aquatic life, bathing, boating, or other recreational purposes and for which quality control is or may be necessary to protect aquatic or terrestrial life or their habitats or the public health, safety, or welfare (Minnesota Rules Ch. 7050.0140 Subp. 3).

The beneficial use classification for all the impaired reaches in the Elm Creek Watershed included in Table 1 above is 2B. Classification as a 2B water is intended to protect cool and warm water fisheries.

E. coli TMDL Target:

The *E. coli* standard for Class 2 waters (Minn. Rules Ch. 7050.0222 Subp. 5) states that *E. coli* concentrations shall "not exceed 126 organisms per 100 milliliters as a geometric mean of not less than five samples in any calendar month, nor shall more than ten percent of all samples taken during any calendar month individually exceed 1,260 organisms per 100 milliliters. The standard applies only between April 1st and October 31st."

MPCA believes that using the 126 organisms per 100 milliliters (126 orgs/ 100 mL) portion of the standard for the TMDL calculations will result in the greatest bacteria reductions within the Elm Creek Watershed and will result in the attainment of the 1,260 orgs/ 100 mL portion of the standard. While the E. coli TMDLs will focus on the geometric mean portion of the standard, attainment of both parts of the standard is required.

The above *E. coli* TMDL target is applicable to the following impaired reaches: AUs 07010206-508, 07010206-525, 07010206-528, and 07010206-732.

TP TMDL Target for Lakes:

The impaired lakes in the Elm Creek Watershed TMDLs include shallow and deep lakes as defined by MPCA. According to Minnesota Rules 7050.0150 and 7050.0222 Subp 4, the numeric eutrophication water quality standards (WQS) applicable to shallow (i.e., $\leq$15 feet maximum depth or $\geq$80% littoral area) and deep lakes and reservoirs in the North Central Hardwood Forest Ecoregion are included in Table 5 below and Table 2 of the final TMDL report. Lakes and reservoirs are to meet the total phosphorus (TP), the chlorophyll-a, and the Secchi disk transparency targets in order to achieve the WQS. The eutrophication standards are compared to data averaged over the summer season (June through September).

Table 5

Parameter	Shallow Lake WQS	Deep Lake WQS
Total Phosphorus	$\leq$ 60 µg/L	$\leq$ 40 µg/L
Chlorophyll-a	$\leq$ 20 µg/L	$\leq$ 14 µg/L
Secchi disk transparency	$\geq$ 1.0 m	$\geq$ 1.4 m

In developing the lake eutrophication standards (Minn. Rule 7050), the MPCA evaluated data from a large cross-section of lakes within each of the state's ecoregions. Clear relationships were established between the causal factor TP and the response variables chlorophyll-a and Secchi disk. Based on these relationships MPCA believes that by meeting the TP targets of 60 µg/L and 40 µg/L, the respective standards for shallow and deep lakes, the chlorophyll-a and Secchi standards will likewise be met. Therefore, in order to maintain the water quality conditions that provide full support of the designated uses for impaired lakes in the Elm Creek watershed, the submitted TMDLs adopted the TP criteria of 60 µg/L and 40 µg/L average concentration over the summer season (June through September) as the primary TMDL targets. EPA concurs with the State's approach to determining the TP targets upon which the TP TMDLs for impaired lakes in the Elm Creek watershed have been established.

The TP TMDL targets included above are applicable to the impaired lakes identified in Table 6 below.

Table 6

Assessment Unit (AU) Name	AU ID	Lake Type
Cowley Lake	27-0169	Shallow
Diamond Lake	27-0125	Shallow
Fish Lake	27-0118	Deep
Henry Lake	27-0175	Shallow
Rice Lake-Main	27-0116-01	Shallow
Sylvan Lake	27-0171	Shallow
Goose Lake	27-0122	Shallow

DO and TP Targets (TP TMDL for Streams):

The DO standard for Class 2B waters is a daily minimum of 5.0 mg/L (Minn. Rules Ch. 7050.0222 subp. 4) that should be met 50 percent of the days at which the flow of the receiving water is equal to the 7-day, 10 year low-flow condition ($7Q_{10}$).

High stream phosphorus levels were identified by MPCA as the primary cause of low DO conditions contributing to degraded stream biologic communities throughout the Elm Creek Watershed. Therefore, in order to address the DO impairments, phosphorus was used as a surrogate pollutant target. Since the Elm Creek Watershed project area is located within the Central River Nutrient Region, the applicable standard criterion for phosphorus in Class 2B streams is less than or equal to 100 µg/l mean from June 1 through September 30.

The above TMDL target is applicable to the following impaired reaches: AUs 07010206-508, 07010206-525, 07010206-528, 07010206-732 and 07010206-760.

TSS TMDL Target:

High stream TSS levels were identified as a significant cause contributing to degraded stream biologic communities throughout the Elm Creek Watershed. Since the Elm Creek Watershed project area is located within the Central River Nutrient Region, the applicable standard criterion for TSS in Class 2B streams is equal to 30 mg/l as a summer mean from April 1 through September 30 which may be exceeded for no more than ten percent (10%) of the time.

The above TMDL target is applicable to the following impaired reaches: 07010206-508, and 07010206-525.

U.S. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this second element.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

A TMDL must identify the loading capacity of a waterbody for the applicable pollutant. U.S. EPA regulations define loading capacity as the greatest amount of a pollutant that a water can receive without violating water quality standards (40 C.F.R. §130.2(f)).

The pollutant loadings may be expressed as either mass-per-time, toxicity or other appropriate measure (40 C.F.R. §130.2(i)). If the TMDL is expressed in terms other than a daily load, e.g., an annual load, the submittal should explain why it is appropriate to express the TMDL in the unit of measurement chosen. The TMDL submittal should describe the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In many instances, this method will be a water quality model.

The TMDL submittal should contain documentation supporting the TMDL analysis, including the basis for any assumptions; a discussion of strengths and weaknesses in the analytical process; and results from any water quality modeling. U.S. EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

TMDLs must take into account *critical conditions* for steam flow, loading, and water quality parameters as part of the analysis of loading capacity (40 C.F.R. §130.7(c)(1)). TMDLs should define applicable *critical conditions* and describe their approach to estimating both point and non-point source loadings under such *critical conditions*. In particular, the TMDL should discuss the approach used to compute and allocate non-point source loadings, e.g., meteorological conditions and land use distribution.

Comments:

E. coli TMDL:

The total loading capacities, i.e. total maximum daily loads, of *E. coli* determined by MPCA for the Elm Creek Watershed are included in Table 7 below, and Tables 11 – 14 of the final TMDL report.

Table 7

E. coli TMDL Allocations (*billions of organisms/day*)						
Impaired AU	**Name**	Diamond Creek				
	ID	07010206-525				
Flow Zones		**Very High**	**High**	**Mid-Range**	**Low**	**Dry**
Existing Load		29.23	16.14	9.46	8.81	0.50
TMDL		**76.59**	**26.28**	**10.20**	**3.71**	**0.80**
Load Reduction		0%	0%	0%	23%	0%
Impaired AU	**Name**	Diamond Creek				
	ID	07010206-525				
Flow Zones		**Very High**	**High**	**Mid-Range**	**Low**	**Dry**
Total WLA		**36.09**	**12.38**	**4.81**	**1.75**	**0.37**
	MS4-Dayton	36.09	12.38	4.81	1.75	0.37
Total LA	*Non-MS4 Runoff*	**36.09**	**12.38**	**4.81**	**1.75**	**0.37**
MOS (5%)		**3.83**	**1.31**	**0.51**	**0.19**	**0.04**
Impaired AU	**Name**	Rush Creek – South Fork				
	ID	07010206-732				
Flow Zones		**Very High**	**High**	**Mid-Range**	**Low**	**Dry**
Existing Load		348.96	90.43	30.73	14.83	3.47
TMDL		**219.44**	**75.11**	**27.80**	**9.49**	**6.44**
Load Reduction		37%	17%	10%	36%	0%
Total WLA		**109.96**	**37.68**	**13.98**	**4.82**	**3.28**
	Maple Hills Estates WWTF	0.14	0.14	0.14	0.14	0.14
	MS4-Corcoran	72.43	24.76	9.13	3.09	2.08
	MS4-Maple Grove	23.63	8.08	2.98	1.01	0.68
	MS4-Medina	13.41	4.58	1.69	0.57	0.38
	MS4-Hennepin County	0.36	0.12	0.04	0.01	0.005
Total LA	*Non-MS4 Runoff*	**98.50**	**33.67**	**12.42**	**4.20**	**2.83**
MOS (5%)		**10.97**	**3.76**	**1.39**	**0.47**	**0.32**
Impaired AU	**Name**	Rush Creek Mainstem				
	ID	07010206-528				
Flow Zones		**Very High**	**High**	**Mid-Range**	**Low**	**Dry**
Existing Load		1335.54	219.97	85.96	19.98	1.68
TMDL		**456.98**	**131.94**	**35.03**	**4.96**	**0.03**
Load Reduction		66%	40%	59%	75%	98%
Total WLA		**164.88**	**47.67**	**12.72**	**1.88**	**0.03**
	Maple Hills Estates WWTF	0.14	0.14	0.14	0.14	**
	MS4-Corcoran	43.33	12.50	3.31	0.46	**
	MS4-Dayton	42.93	12.38	3.28	0.45	**
	MS4-Maple Grove	29.29	8.45	2.24	0.31	**
	MS4-Rogers	47.66	13.75	3.64	0.50	**
	MS4-Hennepin County	0.42	0.12	0.03	0.00	**
	MS4-MnDOT	1.11	0.32	0.08	0.01	**
Total LA	*Non-MS4 Runoff*	**269.25**	**77.68**	**20.56**	**2.84**	**
MOS (5%)		**22.85**	**6.60**	**1.75**	**0.25**	**0.00**
Impaired AU	**Name**	Elm Creek Mainstem				
	ID	07010206-508				
Flow Zones		**Very High**	**High**	**Mid-Range**	**Low**	**Dry**
Existing Load		490.11	120.79	36.82	17.57	3.74
TMDL		**396.59**	**123.99**	**34.06**	**13.22**	**6.13**
Load Reduction		19%	0%	8%	25%	0%

Table 7

E. coli TMDL Allocations (*billions of organisms/day*)						
Impaired AU	**Name**	Elm Creek Mainstem				
	ID	07010206-508				
Flow Zones		**Very High**	**High**	**Mid-Range**	**Low**	**Dry**
Total WLA		**305.29**	**95.46**	**26.24**	**10.20**	**4.75**
	Maple Hills Estates WWTF	0.14	0.14	0.14	0.14	0.14
	MS4-Champlin	18.23	5.70	1.56	0.60	0.28
	MS4-Corcoran	15.32	4.78	1.31	0.51	0.23
	MS4-Dayton	54.54	17.04	4.67	1.80	0.82
	MS4-Maple Grove	141.94	44.34	12.14	4.68	2.14
	MS4-Medina	32.97	10.30	2.82	1.09	0.50
	MS4-Plymouth	32.17	10.05	2.75	1.06	0.49
	MS4-Hennepin County	3.52	1.10	0.30	0.12	0.05
	MS4-MnDOT	6.46	2.02	0.55	0.21	0.10
Total LA	*Non-MS4 Runoff*	**71.47**	**22.33**	**6.11**	**2.36**	**1.08**
MOS (5%)		**19.83**	**6.20**	**1.70**	**0.66**	**0.31**

** Allocation = flow contribution from a given source x 126 cfu *E. coli*/100 ml

TSS TMDLs:

The total loading capacities, i.e. total maximum daily loads, of total suspended solids (TSS) determined by MPCA for the Elm Creek Watershed to address fish biotic integrity and macroinvertebrate biotic integrity impairments are included in Table 8 below, and Tables 26 – 27 of the final TMDL report.

Table 8

TSS TMDL Allocations (*lbs/day*)						
Impaired AU	**Name**	Diamond Creek				
	ID	07010206-525				
Flow Zones		**Very High**	**High**	**Mid-Range**	**Low**	**Dry**
Existing Load		3843.87	1980.6	331.54	181.88	78.79
TMDL		**4021.41**	**1379.63**	**535.51**	**194.74**	**41.78**
Load Reduction		0%	30%	0%	0%	68%
Total WLA		**2621.37**	**899.32**	**349.07**	**126.94**	**27.24**
	Construction Stormwater	40.21	13.80	5.36	1.95	0.42
	Industrial Stormwater	20.11	6.90	2.68	0.97	0.21
	MS4-Dayton	1632.77	560.16	217.43	79.07	16.96
	MS4-Rogers	903.09	309.82	120.26	43.73	9.38
	MS4-Hennepin County	13.74	4.71	1.83	0.67	0.14
	MS4-MnDOT	11.45	3.93	1.52	0.55	0.12
Total LA	*Non-MS4 Runoff*	**1198.97**	**411.33**	**159.66**	**58.06**	**12.46**
MOS (5%)		**201.07**	**68.98**	**26.78**	**9.74**	**2.09**
Impaired AU	**Name**	Elm Creek				
	ID	07010206-508				
Flow Zones		**Very High**	**High**	**Mid-Range**	**Low**	**Dry**
Existing Load		58629.77	32011.66	13064.93	8259.63	3744.87
TMDL		**30221.50**	**11636.48**	**5369.19**	**2938.65**	**1946.69**
Load Reduction		48.5%	63.6%	58.9%	64.4%	48.0%

Table 8

TSS TMDL Allocations (*lbs/day*)						
Impaired AU	**Name**	Elm Creek				
	ID	07010206-508				
Flow Zones		**Very High**	**High**	**Mid-Range**	**Low**	**Dry**
Total WLA		**9740.83**	**4308.60**	**1771.44**	**1391.02**	**1024.43**
	Construction Stormwater	302.22	116.36	53.69	29.39	19.47
	Industrial Stormwater	151.11	58.18	26.85	14.69	9.73
	MS4-Champlin	353.62	157.40	64.38	51.28	37.89
	MS4-Corcoran	1600.87	712.58	291.46	232.17	171.55
	MS4-Dayton	2172.41	966.98	395.51	315.06	232.79
	MS4-Maple Grove	3413.36	1519.35	621.44	495.03	365.77
	MS4-Medina	896.93	399.24	163.30	130.08	96.11
	MS4-Plymouth	625.82	278.56	113.94	90.76	67.06
	MS4-Hennepin County	78.40	34.90	14.27	11.37	8.40
	MS4-MnDOT	146.11	65.03	26.60	21.19	15.66
Total LA		**18969.6**	**6746.06**	**3329.29**	**1400.7**	**824.93**
	Upstream Subwatersheds (Rush/ Diamond Creek)	11690.30	3505.90	2004.00	345.00	44.90
	Non-MS4 Runoff	7279.30	3240.16	1325.29	1055.70	780.03
MOS (5%)		**1511.08**	**581.82**	**268.46**	**146.93**	**97.33**

Total Phosphorus (TP) TMDLs:

The total loading capacities, i.e. total maximum daily loads, of TP determined by MPCA for the Elm Creek Watershed to address the nutrient, DO and fish biotic integrity and macroinvertebrate biotic integrity impairments are included in Table 9 and Table 10 below, and Tables 16 – 22 and Tables 29 – 33 of the final TMDL report.

Table 9

TP TMDL Allocations for Lakes						
Impaired AU (Name/ID)	***Fish Lake (27-0118)***	**Existing Load[3]**	**TMDL Allocations**		**Load Reduction**	
		lbs/year	*lbs/year*	*lbs/day*	*lbs/year*	*Percent*
Total Load		2262.2	**2055.5**	**5.632**	206.7	9.1%
MOS (5%)			**102.8**	**0.282**		
Total WLA		621.8	**621.8**	**1.702**	0	0%
	Construction/ Industrial Stormwater	20.6	20.6	0.056	0	0%
	Maple Grove MS4	551.7	551.7	1.511	0	0%
	Plymouth MS4	37.6	37.6	0.103	0	0%
	Hennepin County MS4	8.2	8.2	0.022	0	0%
	MnDOT MS4	3.7	3.7	0.010	0	0%
Total LA		1640.5	**1331.0**	**3.647**	309.5	19.6%
	Atmospheric Deposition	63.5	63.5	0.174	0	0%
	Internal Load	1577.0	1267.5	3.473	309.5	19.6%

[3] Existing TP load is the average for the years 2010 - 2012.

Table 9

TP TMDL Allocations for Lakes						
Impaired AU (Name/ID)	***Rice Lake – Main Basin (27-0116-01)***	**Existing Load[4]**	**TMDL Allocations**		**Load Reduction**	
		lbs/year	***lbs/year***	***lbs/day***	***lbs/year***	***Percent***
Total Load		12632.7	**2307.1**	**6.321**	10325.6	81.7%
MOS (5%)			**115.4**	**0.316**		
Total WLA		7214.8	**1169.9**	**3.205**	6044.8	83.8%
	Construction/ Industrial Stormwater	23.1	23.1	0.063	0	0%
	Maple Grove MS4	4104.1	654.5	1.793	3449.5	84.1%
	Plymouth MS4	1216.0	193.9	0.531	1022.1	84.1%
	Medina MS4	1271.0	202.7	0.555	1068.3	84.1%
	Corcoran MS4	370.2	59.0	0.162	311.2	84.1%
	Hennepin County MS4	79.1	12.6	0.035	66.5	84.1%
	MnDOT MS4	151.3	24.1	0.066	127.2	84.1%
Total LA		5418.0	**1021.7**	**2.799**	4396.2	81.1%
	Non-MS4 Runoff	1952.3	311.3	0.853	1640.9	84.1%
	Upstream Lake (Fish Lake)	107.0	107.0	0.293	0	0%
	Atmospheric Deposition	88.4	88.4	0.242	0	0%
	Internal Load	3270.3	515	1.411	2755.3	84.3%
Impaired AU (Name/ID)	***Diamond Lake (27-0125)***	**Existing Load[5]**	**TMDL Allocations**		**Load Reduction**	
		lbs/year	***lbs/year***	***lbs/day***	***lbs/year***	***Percent***
TMDL Load		2898.0	**835.8**	**2.290**	2062.2	71.2%
MOS (5%)			**41.8**	**0.114**		
Total WLA		1507.9	**405.5**	**1.11**	1102.4	73.1%
	Construction/ Industrial Stormwater	8.4	8.4	0.023	0	0%
	Dayton MS4	258.4	68.4	0.187	190.0	73.5%
	Rogers MS4	1209.5	320.3	0.877	889.2	73.5%
	Hennepin County MS4	16.2	4.3	0.012	11.9	73.5%
	MnDOT MS4	15.4	4.1	0.011	11.3	73.5%
Total LA		1390.1	**388.6**	**1.064**	1001.5	72.0%
	Non-MS4 Runoff	489.8	129.7	0.355	360.1	73.5%
	Atmospheric Deposition	103.8	103.8	0.284	0	0%
	Internal Load	796.5	155.1	0.425	641.4	80.5%
Impaired AU (Name/ID)	***Goose Lake (27-0122)***	**Existing Load[6]**	**TMDL Allocations**		**Load Reduction**	
		lbs/year	***lbs/year***	***lbs/day***	***lbs/year***	***Percent***
TMDL Load		133.2	**26.7**	**0.073**	106.5	80.0%
MOS (5%)			**1.335**	**0.004**		
Total WLA		41.9	**7.7**	**0.0214**	34.2	81.6%
	Construction/ Industrial Stormwater	0.3	0.3	0.001	0	0%
	Champlin MS4	20.8	3.7	0.010	17.1	82.2%
	Dayton MS4	19.9	3.5	0.010	16.3	82.2%
	Hennepin County MS4	0.9	0.2	0.0004	0.8	82.2%
Total LA		91.4	**17.7**	**0.048**	73.6	80.6%
	Non-MS4 Runoff	3.0	0.5	0.001	2.4	82.2%
	Atmospheric Deposition	17.2	17.2	0.047	0	0%
	Internal Load	71.2	0.0	0.0	71.2	100%

[4] Existing TP load is the average for the years 2010-2012.

[5] Existing TP load is the average for the years 2010-2011.

[6] Existing TP load is the average for the years 2011-2012.

Table 9

TP TMDL Allocations for Lakes						
Impaired AU (Name/ID)		***Cowley Lake (27-0169)***	**Existing Load**[7]	**TMDL Allocations**		**Load Reduction**	
			lbs/year	***lbs/year***	***lbs/day***	***lbs/year***	***Percent***
TMDL Load			846.1	**95**	**0.260**	751.1	88.8%
MOS (5%)				**4.75**	**0.013**		
Total WLA			294.9	**57.7**	**0.159**	237.3	80.4%
	Construction/ Industrial Stormwater		1.0	1.0	0.003	0	0%
	Rogers MS4		292.9	56.5	0.155	236.5	80.7%
	Hennepin County MS4		1.0	0.2	0.001	0.8	80.7%
Total LA			551.2	**32.6**	**0.089**	518.6	94.1%
	Non-MS4 Runoff		123.7	23.8	0.065	99.9	80.7%
	Atmospheric Deposition		8.8	8.8	0.024	0	0%
	Internal Load		418.7	0.0	0.0	418.7	100%
Impaired AU (Name/ID)		***Sylvan Lake (27-0171)***	**Existing Load**[8]	**TMDL Allocations**		**Load Reduction**	
			lbs/year	***lbs/year***	***lbs/day***	***lbs/year***	***Percent***
TMDL Load			1203.1	**204**	**0.559**	999.1	83.0%
MOS (5%)				**10.2**	**0.028**		
Total WLA			49.0	**12.9**	**0.035**	36.1	73.7%
	Construction/ Industrial Stormwater		1.9	1.9	0.005	0	0%
	Rogers MS4		47.1	11.0	0.030	36.1	76.7%
Total LA			1154.1	**180.9**	**0.496**	973.2	84.3%
	Non-MS4 Runoff		237.2	55.2	0.151	182.0	76.7%
	Atmospheric Deposition		39.7	39.7	0.109	0	0%
	Internal Load		877.2	86.0	0.236	791.2	90.2%
Impaired AU (Name/ID)		***Henry Lake (27-0175)***	**Existing Load**[9]	**TMDL Allocations**		**Load Reduction**	
			lbs/year	***lbs/year***	***lbs/day***	***lbs/year***	***Percent***
TMDL Load			972.5	**193.6**	**0.530**	778.9	80.1%
MOS (5%)				**9.7**	**0.027**		
Total WLA			1.8	**1.8**	**0.005**	0	0%
	Construction/ Industrial Stormwater		1.8	1.8	0.005	0	0%
Total LA			970.7	**181.8**	**0.5**	788.6	81.3%
	Non-MS4 Runoff		689.4	121.5	0.333	567.9	82.4%
	Atmospheric Deposition		12.6	12.3	0.035	0	0%
	Internal Load		268.7	48	0.132	220.7	82.1%

[7] Existing TP load is the average for the year 2006.

[8] Existing TP load is the average for the year 2012.

[9] Existing TP load is the average for the years 2009 - 2011.

Table 10

TP TMDL Allocations (*lbs/day*) for Streams						
Impaired AU	**Name**	Diamond Creek				
	ID	07010206-525				
Flow Zones		**Very High**	**High**	**Mid-Range**	**Low**	**Dry**
Existing Load		37.52	16.08	5.1	1.9	0.72
TMDL		**13.40**	**4.60**	**1.79**	**0.65**	**0.14**
Load Reduction		64%	71%	65%	66%	81%

Table 10

TP TMDL Allocations (*lbs/day*) for Streams						
Impaired AU	**Name**	Diamond Creek				
	ID	07010206-525				
Flow Zones		**Very High**	**High**	**Mid-Range**	**Low**	**Dry**
Total WLA		**6.12**	**2.10**	**0.81**	**0.30**	**0.06**
	Construction Stormwater	0.13	0.05	0.02	0.01	0
	Industrial Stormwater	0.07	0.02	0.01	0	0
	MS4-Dayton	3.42	1.17	0.46	0.17	0.04
	MS4-Rogers	2.46	0.84	0.33	0.12	0.03
	MS4-Hennepin County	0.04	0.01	0	0	0
Total LA		**6.62**	**2.27**	**0.88**	**0.32**	**0.07**
	Upstream Lake (Diamond Lake)	3.35	1.15	0.45	0.16	0.03
	Non-MS4 Runoff	3.26	1.12	0.43	0.16	0.03
MOS (5%)		**0.67**	**0.23**	**0.09**	**0.03**	**0.01**
Impaired AU	**Name**	Rush Creek, South Fork (Upper)				
	ID	07010206-760				
Flow Zones		**Very High**	**High**	**Mid-Range**	**Low**	**Dry**
Existing Load		48.99	27.92	12.81	5.45	1.65
TMDL		**19.16**	**6.56**	**2.41**	**0.83**	**0.56**
Load Reduction		61%	77%	81%	85%	66%
Total WLA		**3.70**	**1.27**	**0.47**	**0.16**	**0.11**
	Construction Stormwater	0.19	0.07	0.02	0.01	0.01
	Industrial Stormwater	0.10	0.03	0.01	0	0
	MS4-Corcoran	2.90	0.99	0.36	0.13	0.08
	MS4-Medina	0.51	0.18	0.06	0.02	0.01
Total LA	*Non-MS4 Runoff*	**14.50**	**4.97**	**1.82**	**0.63**	**0.42**
MOS (5%)		**0.96**	**0.33**	**0.12**	**0.04**	**0.03**
Impaired AU	**Name**	Rush Creek, South Fork				
	ID	07010206-732				
Flow Zones		**Very High**	**High**	**Mid-Range**	**Low**	**Dry**
Existing Load		98.56	56.17	25.76	10.97	3.31
TMDL		**38.41**	**13.15**	**4.87**	**1.66**	**1.13**
Load Reduction		61.03%	76.60%	81.12%	84.85%	65.94%
Total WLA		**17.01**	**5.75**	**2.06**	**0.63**	**0.39**
	Maple Hills Estates WWTF	0.25	0.25	0.25	0.25	0.25
	Construction Stormwater	0.38	0.13	0.05	0.02	0.01
	Industrial Stormwater	0.19	0.07	0.02	0.01	0.01
	MS4-Corcoran	9.92	3.35	1.20	0.36	0.22
	MS4-Medina	2.36	0.80	0.28	0.09	0.05
	MS4-Maple Grove	4.10	1.38	0.49	0.15	0.09
	MS4-Hennepin County	0.06	0.02	0.01	0	0
Total LA	*Non-MS4 Runoff*	**19.22**	**6.49**	**2.32**	**0.70**	**0.43**
MOS (5%)		**1.92**	**0.66**	**0.24**	**0.08**	**0.06**
Impaired AU	**Name**	Rush Creek, South Fork				
	ID	07010206-528				
Flow Zones		**Very High**	**High**	**Mid-Range**	**Low**	**Dry**
Existing Load		386.85	97.27	24.15	4.50	0.14
TMDL		**79.98**	**23.09**	**6.13**	**0.86**	**0.01**

Table 10

TP TMDL Allocations (*lbs/day*) for Streams						
Impaired AU	**Name**	Rush Creek, South Fork				
	ID	07010206-528				
Flow Zones		**Very High**	**High**	**Mid-Range**	**Low**	**Dry**
Load Reduction		79.0%	76.0%	75.0%	81.0%	93.0%
Total WLA		**30.43**	**8.71**	**2.24**	**0.23**	**
	Maple Hills Estates WWTF	0.25	0.25	0.25	0.25	**
	Construction Stormwater	0.80	0.23	0.06	0.01	**
	Industrial Stormwater	0.40	0.12	0.03	0	**
	MS4-Corcoran	11.79	3.37	0.87	0.09	**
	MS4-Medina	2.06	0.59	0.15	0.02	**
	MS4-Maple Grove	6.44	1.84	0.47	0.05	**
	MS4-Rogers	4.61	1.32	0.34	0.03	**
	MS4-Dayton	4.15	1.19	0.30	0.03	**
	MS4-Hennepin County	0.09	0.03	0.01	0	**
	MS4-MnDOT	0.09	0.03	0.01	0	**
Total LA		**45.3**	**12.98**	**3.34**	**0.34**	**
	Upstream Lake (Henry Lake)	1.27	0.37	0.10	0.01	**
	Non-MS4 Runoff	44.03	12.61	3.24	0.33	**
MOS (5%)		**4.00**	**1.15**	**0.31**	**0.04**	**0.0005**
Impaired AU	**Name**	Elm Creek				
	ID	07010206-508				
Flow Zones		**Very High**	**High**	**Mid-Range**	**Low**	**Dry**
Existing Load		437.51	132.48	54.21	27.08	13.94
TMDL		**100.64**	**38.75**	**17.91**	**9.82**	**6.50**
Load Reduction		77.0%	70.7%	67.0%	63.8%	53.4%
Total WLA		**39.58**	**15.32**	**7.16**	**4.00**	**2.68**
	Maple Hills Estates WWTF	0.25	0.25	0.25	0.25	0.25
	Construction Stormwater	1.01	0.39	0.18	0.10	0.06
	Industrial Stormwater	0.50	0.19	0.09	0.05	0.03
	MS4-Corcoran	8.76	3.37	1.56	0.85	0.56
	MS4-Champlin	2.04	0.78	0.36	0.20	0.13
	MS4-Dayton	13.27	5.08	2.32	1.25	0.81
	MS4-Maple Grove	8.26	3.16	1.44	0.78	0.51
	MS4-Medina	1.54	0.59	0.27	0.14	0.09
	MS4-Rogers	3.38	1.30	0.59	0.32	0.21
	MS4-Hennepin County	0.19	0.07	0.03	0.02	0.01
	MS4-MnDOT	0.38	0.14	0.07	0.04	0.02
Total LA		**56.02**	**21.49**	**9.85**	**5.33**	**3.50**
	Upstream Subwatersheds (Rush/ Diamond Creek)	20.79	8.00	3.69	2.02	1.34
	Non-MS4 Runoff	35.23	13.49	6.16	3.31	2.16
MOS (5%)		**5.04**	**1.94**	**0.90**	**0.49**	**0.32**

** Allocation = flow contribution from a given source x 100 µg/L TP

Calculation Method Used for the E. coli TMDLs:

The load duration curve (LDC) method was used by MPCA to develop the *E. coli* TMDLs for the Elm Creek Watershed. The LDC method considers how stream flow conditions relate to a variety of pollutant sources (point and nonpoint sources), and can be used to make rough determinations as to what flow conditions result in exceedances of the WQS. The LDC method assimilates flow and pollutant (*E. coli)* data across stream flow regimes, and provides assimilative capacities and load reductions necessary to meet WQSs.

Flow duration curves were developed using flow data collected between 2003 and 2012 during April through October at the furthest downstream flow station in each impaired reach (Figure 17 of the final TMDL report). The stream flow data used for the LDC development was collected from the following flow stations: Station RCSL for Rush Creek, South Fork (AUID 07010206-732); Station RT for Rush Creek mainstem (AUID 07010206-528); Station DC for Diamond Creek (AUID 07010206-525); Station USGS for Elm Creek (AUID 07010206-508) (Figure 16 of the final TMDL report). Since not all of the flow data at the selected monitoring stations covered a full 10-year period of record, a simulated daily flow record was developed to cover the missing period of record. This involved developing a regression equation based on the overlapping period of record between the U.S. Geological Survey's (USGS) monitoring station on lower Elm Creek and the period of record for daily flows at the monitoring site on each reach. This relationship was used to simulate the daily flows for the missing period of record during 2003 through 2012. The daily flows at each station in the impaired reach were then adjusted again to account for the increased contributing watershed area between the location of the monitoring site and the bottom of the impaired reach.

The flow duration curve relates mean daily flow to the percent of time those values have been met or exceeded. The 50% exceedance value is the midpoint or median flow value. The curve is divided into flow zones which include very high (0-10%), high (10- 40%), mid (40-60%), low (60-90%) and dry (90 to 100%) flow conditions. The flow duration curves were transformed to load duration curves by applying the water quality criteria values (*E. coli* standard **-** 126 cfu/100 ml) and converted to daily load. See Figures 18, 19, 20, and 21 of the final report for the calculated load duration curves (LDCs) for *E. coli*. The median load of each flow zone was used to represent the total daily loading capacity (TMDL) of the pollutant (*E. coli)* for that flow zone. Plotted values above the curve lines represent exceedances of the WQ standard (blue line) while those below the lines are below the WQ standard. Also plotted are the mean pollutant concentrations (*E. coli* geomean) for each flow regime (blue sphere). The difference between the WQS standard curve and the mean values (*E. coli* geomean) provides a general percent reduction in the pollutant (*E. coli)* that will be needed to remove each reach from the impaired waters list. Although there are numeric loads for each flow regime, the LDC is what is being approved for these TMDLs.

Calculation Method Used for the TP TMDLs:

TP TMDL Calculation Approach for Lakes:

To determine the TP TMDLs for lakes in the Elm Creek Watershed, the average annual nutrient and water budgets were coupled with a lake response model to calibrate to a monitored in-lake condition for a specified time period (generally a one to three-year time period and always within the 10-year period between 2003 and 2012). Where monitored watershed loads were available, that data was either used directly in the estimation of total watershed loads or a watershed model was calibrated to the monitored loads. Once a lake-specific calibrated model was developed, it was used to define a load response curve that reflected the relationship between total nutrient loading (regardless of source) and in-lake water quality. The curve was used to determine the total load required to meet the June-September in-lake phosphorus standard for that lake (60 µg/l for a shallow lake and 40 µg/l for a deep lake). The total load required to achieve the in-lake water quality goal was established as the loading capacity for that lake.

The BATHTUB model was developed to describe water quality conditions and estimate the assimilative capacity for the impaired lakes within the Elm Creek Watershed. The watershed models developed to estimate tributary loading to impaired lakes were the SWAT model (for areas with agricultural land use) and the P8 model (for areas with urban land use). Refer to Appendixes C, D, E and F of the final report for detailed information on the technical methods and information used to develop the TP TMDLs for the lakes in the Elm Creek Watershed.

The BATHTUB model provides a load response curve that reflected the relationship between watershed loading and in-lake water quality. For the majority of the lakes, the model did not take into account the atmospheric load and any internal load remaining in the model at the time load response curves were developed. There was only one lake (Fish Lake) that was able to achieve the phosphorus standard while performing the load response function with internal loading remaining in the model, because this particular lake was currently close to already meeting the phosphorus standard. Consequently, for the majority of the lakes, the atmospheric load and any internal load that remained in the model were added to the watershed load to determine the total loading capacity for each lake. The load response simulations to determine individual lake loading capacity were identified in Appendix C6 of final TMDL report. The total loading capacity for each lake was then used for the development of the TMDL equation.

Below is a description of how the watershed, atmospheric, and internal loading inputs needed for the BATHTUB model were developed for each lake.

TP Direct Watershed Runoff Loading (Sections 3.0 and 3.1 in Appendix C of the final TMDL report)

The watershed load entered into the BATHTUB model was developed from modeling analysis and/or monitoring data. The watershed models developed to estimate tributary loading to impaired lakes were the SWAT model (for areas with agricultural land use) and the P8 model (for areas with urban land use). These watershed models were developed within the Elm Creek hydrologic watershed boundary, and were calibrated to those areas that had monitored water quality data. Monitored data was occasionally used to represent the tributary loading in the lake response model when quality of the monitoring data was more reliable than watershed modeling results due to model limitations (model limitations further discussed in Appendix D of the final TMDL report). The tributary loading data (monitored data versus modeling results) input into the in-lake response model corresponded with the time period that was used to develop the water quality inputs (Table C-1 in Appendix C of the final TMDL report).

TP Loading from Atmospheric Deposition (Section 5 in Appendix C of the final TMDL report)

Atmospheric deposition loading represents the phosphorus that is bound to particulates in the atmosphere and is deposited directly onto surface waters as the particulates settle out of the atmosphere. The atmospheric depositional loading was estimated within the BATHTUB model. The default BATHTUB value for atmospheric deposition was 0.27 lbs/acre-year (30 mg/m^2-yr). The BATHTUB default value was similar to other atmospheric total phosphorus loading rates reported in a 2007 MPCA technical memorandum. The total surface area of the lake is multiplied by the atmospheric depositional load to determine the load delivered to the lake. The atmospheric depositional loading was included in the overall lake nutrient balance and is identified in the BATHTUB model as precipitation loading. The atmospheric loading was documented in Appendix C3 in Appendix C of the final TMDL report.

TP Internal Loading (Sections 4.0 and 4.1 in Appendix C of the final TMDL report)

There were two primary sources of internal loading that were considered for the in-lake response model. Lake estimates of phosphorus internal loading from (1) sediment release during anoxia and (2) senescence of curly-leaf pondweed. These internal loading estimates were aggregated and compared to the internal loading estimates used as an input into the BATHTUB model. The internal loading estimate input into the BATHTUB model was part of the phosphorus calibration of the in-lake response model.

¾ *Sediment Release of Phosphorus due to Hypolimnetic Anoxia*: Sediment release of phosphorus is initiated by hypoxic/anoxic conditions in the hypolimnion during stratification. Phosphorus released from the sediment diffuses throughout the water column as stratification changes throughout the growing season. Wind mixing and temperature changes are mechanisms that exacerbate the internal diffusion of nutrients from the hypolimnion to epilimnion. Phosphorus from sediment release in the hypolimnion was estimated using the Nürnberg Equation. The Nürnberg Equation calculates internal phosphorus load by using sediment release rates (RR) multiplied by an anoxic factor (AF) that is based on the area and duration of hypolymnetic anoxia (Equations 1 & 3). The anoxic factor represents the number of days that a sediment area, equal to the whole-lake surface area, is overlain by anoxic water (<1 mg O_2/L). The anoxic factor equation (Equation 2), developed by Nürnberg from a data set of lakes in central Ontario and eastern North America, was used for those lakes that did not have temperature and dissolve oxygen profile data.

Equation 1

$$\text{Internal Loading Rate (mg/m}^2\text{-yr)} = AF * RR$$

AF = Anoxic Factor (days/year)

RR = Sediment Release Rate (mg/m^2-day)

Equation 2

$$\text{Anoxic Factor (days/yr)} = -36.2 + 50.1 \log(TP) + 0.762 * Z/A^{0.5}$$

TP = Average summer in-lake TP Concentrations (µg/L)

Z = lake mean depth (m)

A = lake surface (km^2)

Equation 3

$$\text{Internal Load} = \text{Internal Loading Rate (EQ1)} * \text{Hypolimnetic Anoxia Area (m}^2\text{)}$$

¾ *Phosphorus from Senescence of Curly-Leaf Pondweed*: Curly-leaf pondweed is a significant factor inhibiting recreational use as well as potentially degrading the in-lake water quality. Curly-leaf pondweed is an exotic species that typically competes with other native plant species because of its unique life cycle. The plant germinates from turions (seed structures) in early fall when most native plants have died back, and the plant continues to grow slowly during the winter months. Curly-leaf pondweed growth increases substantially after ice-out due to an increase in light availability. The plant begins to die-off (called senescence) after the completion of turion production by the end of June or early July. The senescence of curly-leaf pondweed provides an internal source of nutrients within several impaired lakes of the Elm Creek watershed. Nutrients released from the senescence process are in a soluble form readily available for algae uptake. Consequently, algae blooms frequently develop causing a decrease in water clarity. The senescence of curly-leaf pondweed exacerbates the eutrophication process by causing poor water quality conditions earlier in the season. To estimate the amount of internal loading from curly-leaf pondweed senescence, Three Rivers Park District performed phosphorus analysis on curly-leaf pondweed biomass samples collected from a 1-m^2 quadrant survey that was performed on a lake (Medicine Lake) with nuisance growth conditions. The survey provided an average estimate of curly-leaf pondweed phosphorus per unit area sampled (grams dry-weight/m^2). This estimate was converted to the average pounds of phosphorus/acre (Table C-3 in Appendix C of the final TMDL report) and multiplied by the acreage of curly-leaf pondweed for a particular lake.

TP TMDL Calculation Approach for Streams:

The load duration curve (LDC) method was also used by MPCA to develop the TP TMDLs for impaired streams in the Elm Creek Watershed. For a more in-depth description of the LDC methodology, refer to the "*Calculation Method Used for the E. coli TMDLs*" section above.

To develop the LDC for TP impaired reaches (Figure 27 of the final TMDL report), all the daily average flows were multiplied by the TP standard of 100 µg/l and converted to a daily load to create a continuous LDC. See Figures 28, 29, 30, 31, and 32 of the final report for the calculated load duration curves (LCDs) for TP. Although there are numeric loads for each flow regime, the LDC is what is being approved for these TMDLs.

Calculation Method Used for the TSS TMDLs:

The load duration curve (LDC) method was also used by MPCA to develop the TSS TMDLs for impaired streams in the Elm Creek Watershed. For a more in-depth description of the LDC methodology, refer to the "*Calculation Method Used for the E. coli TMDLs*" section above.

To develop LDC for TSS impaired reaches (Figure 24 of the final TMDL report), all the daily average flows were multiplied by the TSS standard of 30 µg/l and converted to a daily load. See Figures 25 and 26 of the final report for the calculated LCDs for TSS. Although there are numeric loads for each flow regime, the LDC is what is being approved for these TMDLs.

Critical Conditions for E. coli TMDLs:

The critical conditions for the *E. coli* TMDLs in the Elm Creek Watershed are summer **-** fall flow related conditions. Data analysis showed that *E. coli* WQS exceedences mainly occur during summer and fall months under all flow regimes, indicating that the *E. coli* impairment is due to a variety of sources and conditions. High flows can deliver great amounts of pollutants into the streams in runoff conditions from sources such as surface applied manure, over-grazed pastures, feedlots without runoff controls, and non-regulated stormwater. Low flows can concentrate pollutants because the stream's assimilative capacity is being exceeded and the potential for dilution is the lowest. Dry conditions sources may include livestock access to streams, wildlife and failing septic systems.

The Elm Creek Watershed TMDLs accounted for the critical conditions by using the load duration curve approach to develop the *E. coli* TMDLs. The load duration curve approach directly accounts for flow and allows for the evaluation of the flow zones for which the largest load reductions are needed.

Critical Conditions for TSS TMDLs:

The critical conditions for the TSS TMDLs in the Elm Creek Watershed are flow related conditions. The data showed TSS exceedances were recorded across various flow regimes. High flows deliver sediment load into the streams in runoff conditions, while low flows concentrate sediment load because the stream's assimilative capacity is being exceeded and the potential for dilution is the lowest.

The Elm Creek Watershed TMDLs accounted for the critical conditions by using the load duration curve approach to develop the TSS TMDLs. The load duration curve approach directly accounts for flow and allows for the evaluation of the flow zones for which the largest load reductions are needed.

Critical Conditions for TP TMDLs:

The critical conditions for the TP TMDLs in the Elm Creek Watershed correspond to the summer growing season (June through September), when the symptoms of nutrient enrichment normally are the most severe. Surface runoff contains nutrients which are transported into the streams and lakes during summer rain events. Nutrients can also be internally loaded to lakes, resulting from aquatic plant senescence or direct sediment release from hypolimnetic water during summer mixing events.

The Elm Creek Watershed TP TMDLs accounted for the critical conditions by:
¾ using the load duration curve approach to develop the TP TMDLs for impaired streams, which directly accounts for flow and allows for the evaluation of the flow zones for which the largest load reductions are needed.
¾ using lake response models to develop the TP TMDLs for impaired lakes, which focused on the mean total phosphorus during the summer growing season.

U.S. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this third element.

4. Load Allocations (LAs)

U.S. EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity attributed to existing and future non-point sources and to natural background. Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. §130.2(g)). Where possible, load allocations should be described separately for natural background and non-point sources.

Comments:

E. coli LAs:

The load allocations (LAs) of *E. coli* determined by MPCA for the Elm Creek Watershed are included in Table 7 above, and Tables 11 – 14 of the final TMDL report. The existing nonpoint sources contributing to the *E. coli* LA include agricultural runoff (from surface application of manure, over-grazed pastures, livestock access to streams, and feedlots), non-regulated stormwater runoff, wildlife, and failing/nonconforming individual sewage treatment systems (ISTS) (Section 3.5.1.2 of the final TMDL report). The LA was assigned as the remaining load after the MOS and WLA was subtracted from the total load capacity for each flow zone.

TSS LAs:

The load allocations (LAs) of TSS determined by MPCA for the Elm Creek Watershed to address turbidity impairment are included in Table 8 above, and Tables 26 – 27 of the final TMDL report. The existing nonpoint sources contributing to the TSS LA include sediment load from non-regulated stormwater runoff and streambank erosion. The LA was assigned as the remaining load after the MOS and WLA was subtracted from the total load capacity for each flow zone.

TP LAs:

The load allocations (LAs) of TP determined by MPCA for the Elm Creek Watershed to address the nutrient/eutrophication impairments are included in Tables 9 and 10 above, and Tables 16 – 22 and Tables 29 – 33 of the final TMDL report. The existing nonpoint sources contributing to the TP LA include agricultural runoff, non-regulated stormwater runoff, atmospheric deposition, and internal nutrient recycling from the lake bottom sediments.

U.S. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this fourth element.

5. Wasteload Allocations (WLAs)

U.S. EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to individual existing and future point source(s) (40 C.F.R. §130.2(h), 40 C.F.R. §130.2(i)). In some cases, WLAs may cover more than one discharger, e.g., if the source is contained within a general permit.

The individual WLAs may take the form of uniform percentage reductions or individual mass based limitations for dischargers where it can be shown that this solution meets WQSs and does not result in localized impairments. These individual WLAs may be adjusted during the NPDES permitting process. If the WLAs are adjusted, the individual effluent limits for each permit issued to a discharger on the impaired water must be consistent with the assumptions and requirements of the adjusted WLAs in the TMDL. If the WLAs are not adjusted, effluent limits contained in the permit must be consistent with the individual WLAs specified in the TMDL. If a draft permit provides for a higher load for a discharger than the corresponding individual WLA in the TMDL, the State/Tribe must demonstrate that the total WLA in the TMDL will be achieved through reductions in the remaining individual WLAs and that localized impairments will not result. All permittees should be notified of any deviations from the initial individual WLAs contained in the TMDL. U.S. EPA does not require the establishment of a new TMDL to reflect these revised allocations as long as the total WLA, as expressed in the TMDL, remains the same or decreases, and there is no reallocation between the total WLA and the total LA.

Comments:

E. coli WLAs:

The wasteload allocations (WLAs) of *E. coli* determined by MPCA for the Elm Creek Watershed are included in Table 7 above, and Tables 11 – 14 of the final TMDL report. The point sources contributing to the *E. coli* WLAs in the Elm Creek Watershed include: one (1) NPDES wastewater discharger (Maple Hill Estates - Permit # MN0031127); eight (8) MS4s; and construction and industrial stormwater. There are no Concentrated Animal Feeding Operation (CAFOs) currently present in the Elm Creek Watershed. The potential future growth impact on the *E. coli* WLAs for wastewater discharge facilities and MS4s in the Elm Creek Watershed is discussed in Section 4.1.6 of the final TMDL report.

TSS WLAs:

The wasteload allocations (WLAs) of TSS determined by MPCA for the Elm Creek Watershed to address the turbidity impairments are included in Table 9 above, and Tables 26 – 27 of the final TMDL report. The point sources contributing to the TSS WLAs in the Elm Creek Watershed include: nine (9) MS4s; and construction and industrial stormwater. The potential future growth impact on the TSS WLAs for wastewater discharge facilities and MS4s in the Elm Creek Watershed is discussed in Section 4.3.3.5 of the final TMDL report.

TP WLAs:

The waste load allocations (WLAs) of TP determined by MPCA for the Elm Creek Watershed to address nutrient/eutrophication impairments are included in Tables 9 and 10 above, and Tables 16 – 22 and Tables 29 – 33 of the final TMDL report. The point sources contributing to the TP WLAs in the Elm Creek Watershed include: one (1) NPDES wastewater discharger (Maple Hill Estates - Permit # MN0031127); eight (8) MS4s; and construction and industrial stormwater. The potential future growth impact on the TP WLAs for wastewater discharge facilities and MS4s in the Elm Creek Watershed is discussed in Sections 4.2.6 and 4.3.4.5 of the final TMDL report.

U.S. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this fifth element.

6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety (MOS) to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)). U.S. EPA's 1991 TMDL Guidance explains that the MOS may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the MOS. If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described. If the MOS is explicit, the loading set aside for the MOS must be identified.

Comments:

MOS for the E. coli TMDLs:

The MOS incorporated into the *E. coli* TMDLs for the Elm Creek Watershed are included in Table 7 above, and Tables 11 – 14 of the final TMDL report. An explicit MOS equal to 5% of the loading capacity for each flow regime was subtracted before allocations were made among wasteload and non-point sources. A 5% MOS was considered appropriate based on the use of load duration curves in the development of the *E. coli* TMDLs. The LDC approach minimized variability because the calculation of the loading capacity was a function of flow multiplied by the target value. Most of the uncertainty was associated with the estimated flows in each assessed segment. This component of uncertainty was considered to be fairly well controlled, due to overlapping the available extensive continuous flow data (collected over a four to six-year period in at least one location within each impaired reach), and the long-term USGS gaging station on lower Elm Creek (35+ year period of record) in order to simulate a

10-year flow record at the bottom of each reach to provide the basis for development of the LDCs. Additionally, certain conservative assumptions were included in the development of the *E. coli* TMDLs. No rate of decay, or die-off rate of pathogen species, was incorporated in the calculation of the load duration curves for *E. coli*. Bacteria have a limited capability of surviving outside their hosts, and normally a rate of decay would be incorporated.

MOS for the TSS TMDLs:

The MOS incorporated into the TSS TMDLs for the Elm Creek Watershed to address turbidity impairment are included in Table 8 above, and Tables 26 – 27 of the final TMDL report. An explicit MOS equal to 5% of the loading capacity was set aside to account for the uncertainty in the TSS TMDLs. A 5% MOS was considered appropriate for the TSS TMDLs, based upon the use of the LDC approach, which minimized variability because the calculation of the loading capacity was a function of flow multiplied by the target value. Most of the uncertainty was associated with the estimated flows in each assessed segment. This component of uncertainty was considered to be fairly well controlled, due to overlapping the available extensive continuous flow data (collected over a four to six-year period in at least one location within each impaired reach), and the long-term USGS gaging station on lower Elm Creek (35+ year period of record) in order to simulate a 10-year flow record at the bottom of each reach to provide the basis for development of the LDCs.

MOS for the TP TMDLs:

The MOS incorporated into the TP TMDLs for the Elm Creek Watershed are included in Table 9 and Table 10 above, and Tables 16 – 22 and Tables 29 – 33 of the final TMDL report. An explicit MOS equal to 5% of the loading capacity was set aside to account for the uncertainty in the TP TMDL calculations for streams and lakes. A 5% MOS was considered appropriate for the lake TP TMDLs, based upon the reasonably robust data set, which included in-lake monitoring over multiple years and at a frequency of bi-weekly to monthly, and the performance of the lake response models used to predict the TP loads. A 5% MOS was considered appropriate for the stream TP TMDLs, based upon the use of the LDC approach, which minimized variability because the calculation of the loading capacity was a function of flow multiplied by the target value. Most of the uncertainty was associated with the estimated flows in each assessed segment. This component of uncertainty was considered to be fairly well controlled, due to overlapping the available extensive continuous flow data (collected over a four to six-year period in at least one location within each impaired reach), and the long-term USGS gaging station on lower Elm Creek (35+ year period of record) in order to simulate a 10-year flow record at the bottom of each reach to provide the basis for development of the LDCs.

U.S. EPA finds that the TMDL document submitted by MPCA contains an appropriate MOS satisfying all requirements concerning this sixth element.

7. Seasonal Variation

The statute and regulations require that a TMDL be established with consideration of seasonal variations. The TMDL must describe the method chosen for including seasonal variations. (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)).

Comments:

Seasonal Variation for E. coli TMDLs:

The *E. coli* exceedances in the Elm Creek Watershed varied seasonally. *E. coli* exceedances occur during the summer and fall months, and occasionally in the spring. Seasonality of bacteria concentrations are also influenced by stream water temperature. Fecal bacteria are most productive when stream temperatures are highest, at temperatures similar to their origination environment in animal digestive tracts.

Seasonal variation in the *E. coli* TMDLs is addressed by establishing load allocations based on the *E. coli* standard, which is applicable to the aquatic recreational period of April 1 through October 31. Seasonal variation was also considered in the *E. coli* TMDLs through the use of the LDC to establish the TMDLs. The development of the LDCs utilized flow measurements (i.e. continuous flow data collected from local USGS gage and instantaneous flow data) which represented a range of flow conditions within the watershed and thereby accounted for seasonal variability. The LDC approach captures the variation in pollutant concentrations occurring over a range of flow regime conditions in each waterbody reach.

Seasonal Variation for TSS TMDLs:

The TSS exceedances in the Elm Creek Watershed varied seasonally. TSS exceedances in the Elm Creek Watershed impaired reaches were found during spring/summer months (April through September). High flow conditions (i.e. summer storms and spring snowmelt) can drive streambank or field erosion as potential TSS sources, while low flow conditions during warm summer months can drive organic components (i.e. decaying vegetation, algae production and animal material) as potential sources of suspended particles in the water.

Seasonal variation was considered in the TSS TMDLs through the use of the LDCs to establish the TMDLs. The development of the LDCs utilized flow measurements (i.e. continuous flow data collected from local USGS gage) which represented a range of flow conditions within the watershed and thereby accounted for seasonal variability. The LDC approach captures the variation in pollutant concentrations occurring over a range of flow regime conditions in each waterbody reach.

Seasonal Variation for TP TMDLs:

The TP exceedances in the Elm Creek Watershed varied seasonally. TP exceedances in the Elm Creek Watershed impaired reaches were found during summer months (June through September). Summer growing season (June through September), when the symptoms of nutrient enrichment normally are the most severe. Surface runoff contains nutrients which are transported into the streams and lakes during summer rain events. Nutrients can also be internally loaded to lakes, resulting from aquatic plant senescence or direct sediment release from hypolimnetic water during summer mixing events.

Seasonal variation in the TP TMDLs for impaired streams was considered through the use of the LDCs to establish the TMDLs. The development of the LDCs utilized flow measurements (i.e. continuous flow data collected from local USGS gage) which represented a range of flow conditions within the watershed and thereby accounted for seasonal variability. The LDC approach captures the variation in pollutant concentrations occurring over a range of flow regime conditions in each waterbody reach.

Seasonal variation in the TP TMDLs for impaired lakes was considered through the use of lake response models to develop the TP TMDLs for impaired lakes, which focused on the mean total phosphorus during the summer growing season (June through September). By setting the TMDL to meet targets established for the most critical period (summer), the TMDL will inherently be protective of water quality during the other seasons.

U.S. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this seventh element.

8. Reasonable Assurances

When a TMDL is developed for waters impaired by point sources only, the issuance of a National Pollutant Discharge Elimination System (NPDES) permit(s) provides the reasonable assurance that the wasteload allocations contained in the TMDL will be achieved. This is because 40 C.F.R. 122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with "the assumptions and requirements of any available wasteload allocation" in an approved TMDL.

When a TMDL is developed for waters impaired by both point and non-point sources, and the WLA is based on an assumption that non-point source load reductions will occur, U.S. EPA's 1991 TMDL Guidance states that the TMDL should provide reasonable assurances that non-point source control measures will achieve expected load reductions in order for the TMDL to be approvable. This information is necessary for U.S. EPA to determine that the TMDL, including the load and wasteload allocations, has been established at a level necessary to implement water quality standards.

U.S. EPA's August 1997 TMDL Guidance also directs Regions to work with States to achieve TMDL load allocations in waters impaired only by non-point sources. However, U.S. EPA cannot disapprove a TMDL for non-point source-only impaired waters, which do not have a demonstration of reasonable assurance that LAs will be achieved, because such a showing is not required by current regulations.

Comments:

Section 5 of the final TMDL report contains a list of several factors at the local, state and federal level that MPCA considers could provide reasonable assurances that the Elm Creek Watershed TMDLs will be successfully implemented. These factors include:

Regulatory programs:

Existing regulatory programs such as those under NDPES will continue to be administered to control discharges from industrial, municipal, and construction sources (Section 5.1 of the final TMDL report).

Local Management:

The Elm Creek Watershed Management Commission (ECWMC) was formed on February 1, 1973, through a joint powers agreement by Champlain, Corcoran, Dayton, Maple Grove, Medina, Plymouth, and the Hennepin Conservation District (now Hennepin County Environmental Services) under the authority conferred to the member parties through Minn. Stat. § 471.59 and 103B.211. The ECWMC has a comprehensive approach to managing water resources within their jurisdictional limits which includes the following:

¾ All significant development, redevelopment, industrial, and construction projects need to be designed to maintain or improve existing developed hydrology and pollutant loadings to fully comply with the local watershed and government authorities, NPDES, and anti-degradation requirements. The ECWMC currently implements rules that require construction site erosion and sediment controls, post-construction stormwater management, and permits for any wetland alterations.

- Although there have been several versions of the ECWMC's Watershed Management Plan, the most current version was adopted in 2015 and the ECWMC is expected to have another 10-year overall plan adopted in 2025.
- The current ECWMC rules and standards were adopted in 2015 and, among other items, include the stormwater management performance standards developed through the MPCA's Minimal Impact Design Standards (MIDS) project. The ECWMC plans to continue to implement initial abstraction requirements for development, redevelopment, and linear projects as they happen. Initial abstraction requirements are the runoff control requirements to account for the losses in runoff due to depression storage (i.e. shallow depressions), interception (i.e., from vegetation), evaporation, and infiltration.
- The ECWMC implements a water quality monitoring program and intends to perform water quality trend analyses that will allow the Commission to track progress and guide adjustments in the implementation approach. In addition, the ECWMC contracts for routine aquatic plant surveys and will consider the management of aquatic plants based on this information.
- The ECWMC has recently started partnering with member communities on water quality improvement projects. An example of this partnering effort is the ECWMC capital improvements cost-share program, which provides funding to cover up to 25% of project capital costs to public entities for water quality improvement projects.

Additionally, all local units of government within the ECWMC are required to prepare a local watershed management plan, capital improvement program, and official controls as necessary to bring local water management into conformance with the ECWMC Watershed Management Plan. These local plans are reviewed and approved by the ECWMC.

Water Management Plans:

The ECWMC adopted its third generation watershed management plan on October 14, 2015. The updated plan supports the implementation elements of the Elm Creek Watershed TMDLs through regulatory requirements for new and re-development, a public education and outreach program, a capital projects selection and funding process, and a monitoring program. The application of updated stormwater mitigation requirements to new urban/suburban developments in the watershed provides a cost-effective opportunity to significantly decrease pollutant loads relative to current conditions. As part of the third generation plan process, the Commission revised their development requirements for stormwater management to reflect the MIDs standards recommended by the MPCA. An analysis conducted to quantify the potential impact of implementing the revised standards indicated that very significant landscape load reduction of phosphorus, TSS and other pollutants could be achieved, especially where non-urban land uses with high pollutant export potential (such as pasture and cropland) were replaced with urban uses that fully incorporate the stormwater mitigation measures in the Commissions new standards.

The resources for the Elm Creek Watershed TMDL implementation efforts are primarily located within the ECWMC. The ECWMC funds its operations mostly through assessments to member cities, which in turn raise those funds through either a tax levy imposed on residents or a special purpose stormwater utility fee. Revenue raised from these sources fund such ECWMC activities as public education and outreach, monitoring, and preparation of annual activity reports. Capital improvement projects undertaken by the (ECWMC) can be funded through an ad valorem tax levy imposed through

Hennepin County at the ECWMC's request on residents anywhere within the ECWMC jurisdictional limits. This annual tax levy is one of the main funding mechanisms available to support for capital-related implementation activities within the impaired subwatersheds of the Elm Creek Watershed TMDLs. Funds generated through the ad valorem process are used to fund projects outright, sponsor cost-share projects with municipal partners, as well as provide cash matches to secure grants.

Additional funding resources include a mixture of state and federal programs, including (but not limited to) the following: Federal Section 319 Grants for watershed improvements; Funds ear-marked to support TMDL implementation from the Clean Water, Land, and Legacy constitutional amendment, approved by the state's citizens in November 2008; Soil and Water Conservation Districts cost-share funds; NRCS cost-share funds; Minnesota's Clean Water Partnership (CWP) Program matching grant opportunities and loans, as well as technical assistance to local government units (LGUs).

Clean Water Legacy Act (CWLA):

The CWLA was passed in Minnesota in 2006 for the purposes of protecting, restoring, and preserving Minnesota water. In 2008, the CWLA was amended to increase the state sales and use tax rate by three-eighths of 1% on all taxable sales, starting July 1, 2009, and continuing through 2034. Of the funds generated, approximately one third have been dedicated to a Clean Water Fund to, "*protect, enhance, and restore water quality is lakes, rivers, streams, and groundwater, with at least 5% of the fund targeted to protect drinking water sources*".

The CWLA provides the protocols and practices to be followed in order to develop TMDL implementation plans. TMDL implementation plans are expected to be developed within a year of TMDL approval and are required in order for local entities to apply for funding from the State. The CWLA outlines how MPCA, public agencies and private entities should coordinate in their efforts toward improving land use management practices and water management. The CWLA anticipates that all agencies (i.e., MPCA, public agencies, local authorities and private entities, etc.) will cooperate regarding planning and restoration efforts. Cooperative efforts would likely include informal and formal agreements to jointly use technical, educational, and financial resources.

The CWLA also provides details on public and stakeholder participation, and how the funding will be used. In part to attain these goals, the CWLA requires MPCA to develop WRAPS. The WRAPS are required to contain such elements as the identification of impaired waters, watershed modeling outputs, point and nonpoint sources, load reductions, etc. *(Chapter 114D.26:* CWLA). The WRAPS also contain an implementation table of strategies and actions that are capable of achieving the needed load reductions, for both point and nonpoint sources *(Chapter 114D.26,* Subd. 1(8); CWLA). Implementation plans developed for the TMDLs are included in the table, and are considered "priority areas under the WRAPS process *(Watershed Restoration and Protection Strategy Report Template,* MPCA). This table includes not only needed actions but a timeline for achieving water quality targets, the reductions needed from both point and nonpoint sources, the governmental units responsible, and interim milestones for achieving the actions. MPCA has developed guidance on what is required in the WRAPS *(Watershed Restoration and Protection Strategy Report Template,* MPCA). The WRAPS report for Elm Creek Watershed was approved on December 16, 2016.

The Minnesota Board of Soil and Water Resources administers the Clean Water Fund as well, and has developed a detailed grants policy explaining what is required to be eligible to receive Clean Water Fund money (FY 2014 Clean Water Fund Competitive Grants Request for Proposal (RFP); Minnesota Board of Soil and Water Resources, 2014).

U.S. EPA finds that the TMDL document submitted by MPCA adequately addresses this eighth element.

9. Monitoring Plan to Track TMDL Effectiveness

U.S. EPA's 1991 document, *Guidance for Water Quality-Based Decisions: The TMDL Process* (U.S. EPA 440/4-91-001), recommends a monitoring plan to track the effectiveness of a TMDL, particularly when a TMDL involves both point and non-point sources, and the WLA is based on an assumption that non-point source load reductions will occur. Such a TMDL should provide assurances that non-point source controls will achieve expected load reductions and, such TMDL should include a monitoring plan that describes the additional data to be collected to determine if the load reductions provided for in the TMDL are occurring and leading to attainment of water quality standards.

Comments:

Two types of monitoring will track the progress toward achieving the load reductions required in the Elm Creek Watershed TMDLs, and the attainment of WQS: (1) tracking implementation of Best Management Practices (BMPs) on the ground; and (2) physical and chemical monitoring of the waterbody resource.

Progress on TMDL implementation will be measured through regular periodic monitoring of water quality and tracking of the BMP's completed (Table 11 below). This will be accomplished through the combined efforts of the organizations receiving allocations as well as the cooperating agencies (notably the ECWMC and MPCA). The Intensive Watershed Monitoring program conducted by the MPCA is expected to provide a large-scale, longer term picture of the degree to which conditions are changing in the Elm Creek Watershed. Monitoring by the MPCA under this program was last conducted in 2010 and is expected to be undertaken again in 2020 as part of the 10-year monitoring cycle. As part of its third Generation Watershed Management Plan, the Commission will adopt and fund a rotating sampling program for streams and lakes designed in part to monitor progress in implementing the TMDL.

Table 11

Summary of the Monitoring Program to Assess Implementation Progress	
Lake Monitoring	Fish Lake, Diamond Lake, Rice Lake will continue to be monitored at least every two years because of their visibility and priority as a public resource. The other lakes (Henry, Goose, Cowley, and Sylvan) will be monitored at least once every three years as access is made available and resources – either through volunteers or under contract with professional staff- are allocated. Lakes are generally monitored for chlorophyll a, TP, and Secchi disk transparency. Aquatic plant surveys should also be conducted on each lake at approximately five year intervals. In-lake monitoring will continue as implementation activities are undertaken across the respective watersheds. These monitoring activities will continue until water quality goals are met. Some inflow monitoring has been completed on the inlets to some of the lakes (notably on Elm Creek above Rice Lake) and may be important to continue as implementation activities take place in those subwatersheds. The DNR will continue to conduct fish surveys on lakes with developed public access (currently Fish Lake and Diamond Lake) as allowed by their regular schedule. Currently, fish surveys are conducted every five years.

Table 11

Summary of the Monitoring Program to Assess Implementation Progress	
Stream Monitoring	Stream monitoring in the Elm Creek Watershed, which includes Elm Creek, Rush Creek, and Diamond Creek, has been coordinated by the ECWMC. The Commission currently partners with the USGS to operate a flow and water quality monitoring station on Elm Creek. The station has a long-term period of record (35+ years) and gauges discharge from about 70% of Elm Creek Watershed. Other efforts have included those funded by the MPCA through a Surface Water Assessment Grant (SWAG) and the TMDL itself to carry out flow and/or water quality monitoring at the sites shown in Figure 3 in Section 3.2 of this report. The Commission will continue to partner with the USGS to obtain routine flow and water quality data at the site on Elm Creek. As funding allows, monitoring will be carried out further upstream on Elm Creek as well as at some or all of the sites used to generate data for the TMDL. As BMP practices are implemented in the watershed, it is also suggested that monitoring will take place in those subwatersheds to track progress toward meeting the TMDLs for the stream reaches of interest.
Stream Biologic Monitoring	Continuing to monitor water quality and biotic communities so that composite metrics can be developed will help determine the need for/effectiveness of stream habitat restoration measures in bringing the watershed into compliance with standards for biota. At a minimum, fish and macroinvertebrate sampling should be conducted by the MPCA, DNR, or other qualified agencies every 5 to 10 years during the summer season at each established location until compliance is observed for two consecutive assessments.

U.S. EPA finds that this ninth element has been adequately addressed in the TMDL document submitted by MPCA, although U.S. EPA is not approving these recommendations for monitoring or any other aspect of Minnesota's monitoring program through this decision.

10. Implementation

U.S. EPA policy encourages Regions to work in partnership with States/Tribes to achieve non-point source load allocations established for 303(d)-listed waters impaired by non-point sources. Regions may assist States/Tribes in developing implementation plans that include reasonable assurances that non-point source LAs established in TMDLs for waters impaired solely or primarily by non-point sources will in fact be achieved. In addition, U.S. EPA policy recognizes that other relevant watershed management processes may be used in the TMDL process. U.S. EPA is not required to and does not approve TMDL implementation plans.

Comments:

Section 7 of the final TMDL report presents implementation alternatives for resolving the water quality problems associated with the Elm Creek Watershed TMDLs (Table 12 below). Also, Section 5 of the final TMDL report contains a list of several factors at the local, state and federal level that MPCA considers could provide reasonable assurances that the Elm Creek watershed TMDLs will be successfully implemented.

Table 12

Implementation Strategy Summary	
Permitted Sources	Existing regulatory programs such as those under NDPES will continue to be administered to control discharges from WWTFs, and regulated stormwater from industrial, municipal, and construction sources (Sections 7.2.1 – 7.2.4 of the final TMDL report).

Table 12

Implementation Strategy Summary	
Non-Permitted Sources	Discussions about implementation strategies needed to address NPS sources affecting nutrient, bacteria, and sediment loads throughout the Elm Creek Watershed are included in Sections 7.3.1 – 7.3.4 of the final TMDL report. The NPS sources identified in these sections include agriculture, rural residential with livestock, on-site septic systems (ISTSs), and internal nutrient loads (Lakes).
Best Management Practices	A variety of BMPs to restore and protect the lakes and streams within the Elm Creek Watershed have been outlined and prioritized in the WRAPS report. Some of the recommended implementation measures are discussed below. Installation and Enhancement of Buffers/Shoreline Restoration One of the larger potential sources of *E. coli* and nutrient loading in the upper watershed is associated with pasture use. Installation of new or enhancement of existing buffers to maintain native vegetation along stream banks will help stabilize the streambanks themselves as well as filter runoff from pastures near streams and waterways. Many riparian property owners in all parts of the watershed maintain turf to the shoreline. Property owners should be encouraged/incentivized to restore a portion of their shoreline with native plants to reduce erosion, capture/filter direct runoff, and improve the nearshore riparian habitat that is so important to most of the desirable fish species found in lakes and streams. Rough Fish Management Where appropriate, monitoring and management of the fish community should be undertaken to restore or maintain quality fish communities. Opportunities to assess rough fish populations (particularly common carp) should be undertaken where there is reason to believe those populations are above the metrics conducive for clear water, native rooted aquatic plant-dominated in-lake condition and a healthy fish community. Control measures appropriate to the magnitude of the problem and the site-specific features of the situation should be undertaken to limit reproductive and recruitment success and rough fish migration. Biotic Integrity Improvement Strategies Physical habitat improvements in stream reaches with impaired biota will likely be necessary, based on the results of the SID. These improvements are likely to be diverse, including stabilizing eroding stream banks using bio-engineering techniques, improving stream re-aeration capabilities, re-establishing floodplain connectivity, and providing deep water higher oxygen refuges for desirable fish species in stream reaches where low DO episodes present a risk to the survival of those species. Subwatershed Assessments The level of detail of the analysis conducted for this TMDL is not generally sufficient to identify specific parcels of neither land nor specific projects that are the most cost-effective for achieving load reductions to the water bodies identified. Additional effort to identify and evaluate potential projects will often be needed as a follow-up activity to this plan, especially for agricultural areas. These efforts should include on-the-ground field investigations to identify the highest priority areas for improvement, development of site-specific remedies, and development of project costs and load reduction benefits. The upper reaches of the Rush Creek Subwatershed appear to be a prime area to conduct such an effort because of the elevated concentrations of bacteria and phosphorus monitored the high concentration of livestock, and close proximity to conveyance features of some of those operations. An excellent example of a subwatershed assessment approach is an assessment completed by Hennepin County (2014) for the Dance Hall Creek Subwatershed of Lake Sarah in western Hennepin County. The outcome of the assessment effort can then be used as the basis to solicit cooperation from affected land owners, inform capital improvement project planning and implementation, and compile effective grant applications.

Table 12

Implementation Strategy Summary	
Best Management Practices	High Infiltration Potential Assessment Poor baseflow conditions and high streamflow volumes are issues throughout much of the Elm Creek Watershed, especially in some of the lower reaches of the major streams. Thus, taking advantage of areas that have a high infiltration capacity will be important in reducing runoff volumes and enhancing baseflows as the watershed develops. Consideration should be given to carrying out an assessment to identify these areas early so that the Commission and/or cities can work with the land owners to take advantage of these features as opportunities arise. Special attention should be given to stream corridors and the uplands within or immediately adjacent to them, as infiltrated water in these areas may be more likely to result in increased baseflows. Additional Monitoring The magnitude of the reductions necessary to meet some of the TMDLs will be challenging, and continued periodic water quality monitoring will be necessary for evaluating progress in guiding the process. As per the SID report, additional monitoring should be conducted to describe the role of wetland complexes in low DO episodes in various stream reaches. Wetland-driven low DO conditions appear to be especially prevalent in the lower reaches of Elm Creek, and synoptic surveys are likely to be helpful in better defining the relationship between the two conditions. Finer scale monitoring efforts are also likely to have a role to play in identifying locations in specific watersheds that may be contributing a disproportionately high amount of loading to particular stream reaches. Again, synoptic approaches may be appropriate here as well, especially during or immediately after runoff events and perhaps as part of an overall subwatershed assessment.
Adaptive Management	The implementation strategies and elements focus will be carried out in the context of adaptive management (Figure 33 of the final TMDL report). Continued monitoring and "course corrections" in response to technically sound monitoring results are the most appropriate strategy for attaining the water quality goals established in the Elm Creek Watershed TMDL report. Management activities will be changed or refined to efficiently meet the TMDLs and lay the groundwork for de-listing the impaired water bodies.
Education and Outreach	Educational and outreach opportunities in the watershed should be pursued on such topics as fertilizer use, manure management, grazing management, low-impact lawn care practices, and other topics to increase awareness of sources of pollutant loadings to lakes and streams. A high priority of these efforts should be to encourage the adoption of good individual property management practices across all land uses. Also included should be efforts to educate the public on the benefits of a healthy rooted aquatic plant community and the role it plays in a healthy lake or stream system, along with appropriate management expectations, objectives and tools to manage the aquatic plant community without destroying the benefits it offers.
Cost	The Clean Water Legacy Act requires that a TMDL include an overall approximation of the cost to implement a TMDL [Minn. Stat. 2007 § 114D.25]. Based on a review of the impairments and the scale at which restoration will be necessary in the watershed, it is estimated that a dollar range of $12,300,000 to $25,100,000 might be necessary. An identification of the types of projects and assumptions as well as whether each type of project applies to permitted, non-permitted, or both sources is included in Appendix H of final TMDL report. The cost range of each project identified in Appendix H is an estimate and many aspects can cause the costs to rise or fall as implementation takes place across the watershed.

Although a formal implementation plan is not required as a condition for TMDL approval under the current U.S. EPA regulations, U.S. EPA finds that the TMDL document submitted by MPCA adequately addresses this tenth element.

11. Public Participation

U.S. EPA policy is that there should be full and meaningful public participation in the TMDL development process. The TMDL regulations require that each State/Tribe must subject calculations to establish TMDLs to public review consistent with its own continuing planning process (40 C.F.R. §130.7(c)(1)(ii)). In guidance, U.S. EPA has explained that final TMDLs submitted to U.S. EPA for review and approval should describe the State's/Tribe's public participation process, including a summary of significant comments and the State's/Tribe's responses to those comments. When U.S. EPA establishes a TMDL, U.S. EPA regulations require U.S. EPA to publish a notice seeking public comment (40 C.F.R. §130.7(d)(2)).

Provision of inadequate public participation may be a basis for disapproving a TMDL. If U.S. EPA determines that a State/Tribe has not provided adequate public participation, U.S. EPA may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or by U.S. EPA.

Comments:

Public participation opportunities for the Elm Creek Watershed TMDLs were provided in the form of public meetings, electronic communications and ECWMC's website (Section 8 of the final TMDL report).

The Elm Creek Watershed TMDLs were public noticed from July 5 to August 4, 2016. Copies of the draft TMDL Report for Elm Creek Watershed were available to the public upon request and on the MPCA website at http://www.pca.state.mn.us/index.php/water/water-types-and-programs/minnesotas-impaired-waters-and-tmdls/tmdl-projects/tmdl-projects-and-staff-contacts.html.

As part of the final TMDL submittal to EPA, the state provided copies of the press releases of public notice, letters of invitation to interested parties, the mailing list of interested parties, and copies of the written comments received during the public comment period and the state responses to these comments.

MPCA received comments from various parties (i.e. MnDOT Metro District, MN Department of Agriculture, City of Plymouth, City of Medina, City of Corcoran, and U.S. EPA) during the Elm Creek Watershed TMDL public comment period. Comments were received for both the draft TMDL report and the WRAPS report. Comments about the TMDL report were mainly in regards the following topics:

- Suggested language changes regarding specific references related to sources:
  - City of Corcoran requested clarifications on livestock estimates. In response, MPCA added the requested changes.
  - City of Corcoran requested updated information about septic system failure rates. In response, MPCA revised the report to reflect updated information about septic system failure rates.
  - MnDOT Metro District requested a summary table identifying affected MS4 by impaired waterbody segments. In response, MPCA added the requested changes.
- Suggested language changes regarding implementation:
  - MN Department of Agriculture suggested additions on funding program opportunities and BMP projects. In response, MPCA added the requested changes to report under Appendix I.
  - City of Corcoran requested updated information about likely cost of improving Maple Hill

Estates WWTF. In response, MPCA added the requested changes to the report under Appendix H.

¾ Language clarification request about surrogate TMDL targets (TP and TSS) addressing DO and biotic integrity impairments. In response, MPCA added the requested clarifying language.

¾ Concerns regarding TMDL allocations and expected reductions for meeting WQS
  - o Concerns about TP load reduction expectations coming from the City of Plymouth regarding MS4s. In response MPCA emphasize that achieving reductions needed to meet WQS may be challenging, and the continued collection of water quality data is very important for evaluating TMDL allocations.
  - o Concerns about the significantly greater contribution of internal loading estimate calculated as part of the lake TP TMDL and its impact on the City of Plymouth water management planning. In response MPCA explains its confidence in the internal loading estimate calculations.
  - o Concerns regarding the baseline year data used to calculate TP reductions. In response MPCA adjusted the baseline year data used in the TP TMDL calculations.
  - o City of Corcoran requested clarifications as to how might slower than expected land use changes affect the City of Corcoran MS4 WLA. In response, MPCA clarified that the City of Corcoran MS4 WLA will be impacted by the rate at which development actually occurs.
  - o City of Corcoran requested an explanation on the reasons why simulated data can be trusted in the development of TMDL allocations. In response, MPCA clarified that the use of simulated flows, based on long-term streamflow data from nearby USGS gaging station, to fill gaps in site-specific flow is an accepted scientific practice for supporting LDC approach.
  - o MnDOT Metro District raised concerns regarding their assigned WLA given that transportation represents 1% land use within each of the affected subwatersheds. In response, MPCA emphasized the state's attempt to fairly distribute reductions in TMDL calculations given the water quality goal considerations.
  - o MnDOT Metro District requested to include existing load and % reductions by flow regime in the TMDL tables. In response, MPCA added the requested changes.
  - o MnDOT Metro District raised concerns regarding assigned TP MS4 allocation in the impaired lakes being lower that the assigned allocation for atmospheric deposition. In response, MPCA made modifications to the TP TMDL allocations for lakes to focus primarily on internal loading source reductions which is the greatest source of TP load.

All comments received were adequately addressed by MPCA.

U.S. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this eleventh element.

12. Submittal Letter

A submittal letter should be included with the TMDL submittal, and should specify whether the TMDL is being submitted for a *technical review* or *final review and approval*. Each final TMDL submitted to U.S. EPA should be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for U.S. EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and U.S. EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final review and approval, should contain such identifying information as the name and location of the waterbody, and the pollutant(s) of concern.

<u>Comments</u>:

The U.S. EPA received the formal submission of the final Elm Creek Watershed TMDLs on January 10, 2017 along with a cover letter from Rebecca J. Flood, Assistant Commissioner, MPCA dated January 4, 2017. The letter stated that the Elm Creek Watershed TMDLs were final TMDLs submitted under Section 303(d) of CWA for EPA review and approval. The letter also contained the waterbody segment names, and the causes/pollutants of concern for the TMDLs submitted.

U.S. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this twelfth element.

13. Conclusion

After a full and complete review, U.S. EPA finds that the TMDLs for the Elm Creek Watershed satisfy the elements of approvable TMDLs. These approvals address twelve (12) waterbody segments and three (3) pollutants for a total of eighteen (18) TMDLs addressing twenty-four (24) impairments (See <u>Table 1</u> above).

U.S. EPA's approval of the Elm Creek Watershed TMDLs extend to the waterbodies which are identified in this decision document and the TMDL study with the exception of any portions of the waterbodies that are within Indian Country, as defined in 18 U.S.C. Section 1151. U.S. EPA is taking no action to approve or disapprove the State's TMDLs with respect to those portions of the waters at this time. U.S. EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under Section 303(d) for those waters.